

Answers

CHAPTER 1 Credit and borrowing

Are you ready?

- 1 a 0.40 b 0.12 c 0.08
 d 0.024 e 0.003 f 0.075
 g 0.0025 h 0.0002
- 2 a \$1500 b \$369.50 c \$9250
 d \$16.20 e \$410 f \$46.80
- 3 a \$2520 b \$7475 c \$16 875 d \$2340
- 4 a $n = 5, r = 6\% = 0.06$
 b $n = 8, r = 4.5\% = 0.045$
 c $n = 12, r = 2.2\% = 0.022$
 d $n = 120, r = 0.6\% = 0.006$
 e $n = 30, r = 0.058\% = 0.00058$
- 5 a \$9881.07 b \$108 184.55
 c \$5439.07 d \$194 445.84
- 6 a $d = 10$ b $A = 45$ c $s = 32.75$

Exercise 1A – Flat rate interest

- 1 a \$700 b \$1200 c \$7500
 d \$2850 e \$390
- 2 \$1584 3 \$5000
- 4 a \$4060 b \$21 330 c \$1803.75
 d \$308.25 e \$275 000
- 5 a \$1650 b \$3850 c \$693
 d \$6193
- 6 a \$1600 b \$6600 c \$137.50
 7 a \$800 b \$2800 c \$53.85
 8 a \$2000 b \$6000 c \$2160
 d \$8160 e \$226.67
- 9 \$43.33 10 B 11 C 12 8%
- 13 a \$2400 b \$9600
 c \$16 319.88 d 15%
- 14 15%

Exercise 1B – Home loans

- 1 a \$800 b \$79 950
 2 a \$1125, \$179 456.38 b \$543.62
 c \$1121.60, \$178 909.36 d \$547.02

3

Month	Principal (\$)	Interest (\$)	Balance (\$)
1	150 000.00	1200.00	149 791.99
2	149 791.99	1198.34	149 582.32
3	149 582.32	1196.66	149 370.96
4	149 370.96	1194.97	149 157.92
5	149 157.92	1193.26	148 943.18
6	148 943.18	1191.55	148 726.71
7	148 726.71	1189.81	148 508.51
8	148 508.51	1188.07	148 288.57
9	148 288.57	1186.31	148 066.87
10	148 066.87	1184.53	147 843.40

4 a

Month	Principal (\$)	Interest (\$)	Balance (\$)
1	255 000.00	1912.50	254 618.19
2	254 618.19	1909.64	254 233.52
3	254 233.52	1906.75	253 845.96
4	253 845.96	1903.85	253 455.49
5	253 455.49	1900.92	253 062.10
6	253 062.10	1897.97	252 665.75
7	252 665.75	1894.99	252 266.44
8	252 266.44	1892.00	251 864.13
9	251 864.13	1888.98	251 458.80
10	251 458.80	1885.94	251 050.43
11	251 050.43	1882.88	250 639.00
12	250 639.00	1879.79	250 224.48

b

Month	Principal (\$)	Interest (\$)	Balance (\$)
1	255 000.00	1912.50	254 412.50
2	254 412.50	1908.09	253 820.59
3	253 820.59	1903.65	253 224.25
4	253 224.25	1899.18	252 623.43
5	252 623.43	1894.68	252 018.11
6	252 018.11	1890.14	251 408.24
7	251 408.24	1885.56	250 793.80
8	250 793.80	1880.95	250 174.76
9	250 174.76	1876.31	249 551.07
10	249 551.07	1871.63	248 922.70
11	248 922.70	1866.92	248 289.62
12	248 289.62	1862.17	247 651.79

c \$2572.69

5 \$243 123

6 a \$302 308.80 b \$241 500 c \$60 808.80

- 7 A
8 B
9 a \$112 034 b \$86 072
c \$61 789.40 d \$39 329.60
10 a Smith family pays \$24 000; Jones family pays \$36 000

b

Smith family			
Month	Principal (\$)	Interest (\$)	Balance (\$)
1	200 000.00	1583.33	199 583.33
2	199 583.33	1580.04	199 163.37
3	199 163.37	1576.71	198 740.08
4	198 740.08	1573.36	198 313.44
5	198 313.44	1569.98	197 883.42
6	197 883.42	1566.58	197 450.00
7	197 450.00	1563.15	197 013.14
8	197 013.14	1559.69	196 572.83
9	196 572.83	1556.20	196 129.03
10	196 129.03	1552.69	195 681.72
11	195 681.72	1549.15	195 230.87
12	195 230.87	1545.58	194 776.44

Jones family		
Principal (\$)	Interest (\$)	Balance (\$)
200 000.00	1583.33	198 583.33
198 583.33	1572.12	197 155.45
197 155.45	1560.81	195 716.27
195 716.27	1549.42	194 265.69
194 265.69	1537.94	192 803.62
192 803.62	1526.36	191 329.98
191 329.98	1514.70	189 844.68
189 844.68	1502.94	188 347.62
188 347.62	1491.09	186 838.70
186 838.70	1479.14	185 317.84
185 317.84	1467.10	183 784.94
183 784.94	1454.96	182 239.91

c \$12 536.53

10 Quick Questions 1

- 1 \$420 2 \$1135.20
3 \$7025 4 \$975
5 \$5525 6 \$2817.75
7 \$8342.75 8 \$231.74
9 \$1640 10 \$265 577

Exercise 1C – The cost of a loan

- 1 11.6%
2 a 11.6% b 8.32% c 15.2%
d 10.6% e 12.2%
3 a 8.32% b 8.66% c 9.01%
d 9.39% e 11.6% f 18.3%
4 a \$213 996 b \$128 996 c 6.0704%
5 9.01%
6 Loan 1
7 a \$231 546 b \$200 745.60
c \$145 593.60
8 Loan 2 – they will save \$6041
9 C
10 a \$341 376 b \$337 578
11 D
12 a \$562 279.20 b 6.25% c 5.8%

Exercise 1D – Credit cards

- 1 \$136.50
2 a \$175 b \$59.73 c \$24.64
d \$10 e \$46.03
3 \$27.75

4 \$18.13

- 5 a \$1800 b \$31.50 c \$1831.50
d \$1863.55
6 a \$1767.50 b \$88.38 c \$20.26, \$2046.68
7 a \$296.40, \$256.40 b \$4.12, \$260.52
8 a 0.0452% b \$19.34 c \$73.34
d \$1411.37
9 a \$1000 b \$15 c \$530.23
d \$17.50 e \$11.87 f \$535.55
g The card with the interest-free period

10 Quick Questions 2

- 1 \$2835 2 160% p.a.
3 \$299 191.20 4 10.3%
5 6.0%
6 The customer has until the due date of the next statement to pay the whole balance before any interest is charged.
7 \$164.88 8 \$41.96
9 \$32.98 10 \$61.28

Exercise 1E – Loan repayments

- 1 \$674.25
2 a \$90.46 b \$341.25 c \$819.84
d \$1101.00 e \$1515.54
3 a \$400 b \$3600 c \$123.05
4 They will not need to increase their repayments.
5 a \$1510.20 b \$1620.14
6 Yes. The repayment is \$744 and the most he can afford is \$750.

- 7 a \$7000 b \$1750 c \$178 000
 8 a \$733.40 b \$174.80
 9 a \$2895 b \$868 500 c \$493 500
 d \$19 740 e 5.262%
 10 a \$1696.80 b \$509 040 c \$269 040
 d 4.481% e i 4.3% ii 4.12%

Chapter review

- 1 a \$1120 b \$7187.50 c \$1281.60
 d \$39.60 e \$12 285.00
 2 \$6760
 3 \$191.02
 4 6.15%
 5 a \$1250 b \$124 873.64

6 a

Month	Principal (\$)	Interest (\$)	Balance (\$)
1	130 000.00	866.67	129 779.30
2	129 779.30	865.20	129 557.12
3	129 557.12	863.71	129 333.47
4	129 333.47	862.22	129 108.32
5	129 108.32	860.72	128 881.67
6	128 881.67	859.21	128 653.51
7	128 653.51	857.69	128 423.83
8	128 423.83	856.16	128 192.62
9	128 192.62	854.62	127 959.87
10	127 959.87	853.07	127 725.56
11	127 725.56	851.50	127 489.70
12	127 489.70	849.93	127 252.26

b

Month	Principal (\$)	Interest (\$)	Balance (\$)
1	130 000.00	866.67	129 366.67
2	129 366.67	862.44	128 729.11
3	128 729.11	858.19	128 087.31
4	128 087.31	853.92	127 441.22
5	127 441.22	849.61	126 790.83
6	126 790.83	845.27	126 136.10
7	126 136.10	840.91	125 477.01
8	125 477.01	836.51	124 813.52
9	124 813.52	832.09	124 145.61
10	124 145.61	827.64	123 473.25
11	123 473.25	823.16	122 796.40
12	122 796.40	818.64	122 115.05

- c \$5137.21
 7 a \$596 844 b \$18 884
 8 a 7.25% b 13.70%
 c 25.65% d 14.11%
 9 a \$18 223.20 b \$4723.20 c 7%
 10 Loan 2
 11 \$21.15
 12 \$17.00
 13 \$3.21

- 14 a 0.0534% b \$34.82
 c \$102.98 d \$32.82
 15 a \$316.75 b \$599.40
 c \$2369.11 d \$5100
 16 a \$2453.49 b \$2618.06

Practice examination questions

- 1 C
 2 C
 3 A
 4 D
 5 a \$4140 b \$6292.80
 c \$30.25 d 15.76%
 6 a \$1678.50 b \$402 840
 c \$1825.34 d \$422 193.55
 7 a \$13.78 b \$261.72 c \$4.58
 d The card with this interest-free period is cheaper as the card without the interest-free period would have charged \$6.75 interest.

CHAPTER 2 Further applications of area and volume

Are you ready?

- 1 a 50.3 cm² b 1206.9 cm²
 c 63.6 cm² d 304.8 cm²
 2 a 20.25 cm² b 40.33 cm² c 52.44 cm²
 3 a 5832 cm² b 2376 cm² c 624 cm³
 4 a 3820 cm³ b 7238.2 cm³
 5 163.3 cm³
 6 a 14.5 cm–15.5 cm b 8.25 m–8.36 m
 c 4750 km–4850 km

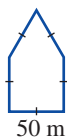
Exercise 2A – Area of parts of the circle

- 1 128.7 cm²
 2 a 254.47 cm² b 3421.19 mm²
 c 172.03 m² d 2206.18 cm²
 e 46.32 m² f 113.85 m²
 3 176.7 m²
 4 40.7 m²
 5 a 14.16 cm² b 6451.26 mm²
 c 92.33 m² d 110.79 mm²
 e 796.39 m² f 955.67 mm²
 6 827.3 cm²
 7 339.3 cm²
 8 a 239 cm² b 240 m² c 18 100 mm²
 9 a 2.5 m b 3.5 m c 18.8 m²
 10 188.5 cm²
 11 a 5892 mm² b 308 m² c 924 cm²
 12 B
 13 B
 14 A
 15 a 78.5 m² b 122.5 m² c 25.5 m²
 16 a 314.16 cm² b 5 cm c 157.08 cm²

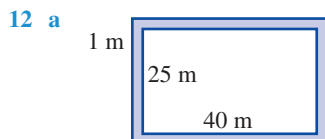
Exercise 2B – Area of composite shapes

- 1 248 m²
 2 a 222 cm² b 375 cm² c 335 cm²
 d 228.5 cm² e 44.6 cm² f 130.3 cm²
 3 a 8 cm b 84 cm²

- 4 a 5.3 m b 31.8 m²
 5 a 120 m² b 168 cm² c 6658 mm²
 6 a 174 cm² b 510 m² c 4032 mm²
 7 A
 8 B
 9 a b 250 m c 3582.5 m²



- 10 a 80 m² b 109.7 cm²
 c 12.2 cm² d 58.4 cm²
 e 4600 mm² f 20.1 m²
 11 2513 m²



- 12 a b 1000 m²
 c 134 m² d \$2345

10 Quick Questions 1

- 1 452.4 cm² 2 31.2 m²
 3 171.3 cm² 4 13 939.2 mm²
 5 306 cm² 6 625 cm²
 7 1428.3 m² 8 1147.6 cm²
 9 17 121.8 mm² 10 670.9 cm²

Exercise 2C – Simpson's rule

- 1 a 30 m
 b $d_f = 40$ m, $d_m = 9$ m, $d_l = 18$ m
 c 940 m²
 2 a 1296 m² b 1560 m² c 936 m²
 3 a 620 m² b 880 m² c 1500 m²
 4 a 2535 m² b 1184 m² c 2934 m²
 5 C
 6 B
 7 2514 m²
 8 a 2970 m² b 11 840 m² c 1386 m²
 9 a 768 m² b 640 m²
 10 2484 m²

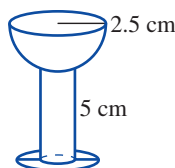
Exercise 2D – Surface area of cylinders and spheres

- 1 502.7 cm²
 2 a 282.7 cm² b 18.7 m² c 3141.6 cm²
 d 785.4 cm² e 437.4 cm² f 54.9 m²
 3 37.4 m²
 4 452 cm²
 5 a 395.4 cm² b 1616.5 cm²
 c 2199.1 cm² d 367.9 cm²
 e 640.9 cm² f 52.8 m²
 6 a 231 cm² b 154 cm²
 7 113 cm²
 8 a 804.2 cm² b 55.4 cm²
 c 2463.0 cm² d 12.6 m²
 e 145.3 cm² f 40.7 m²
 9 5542 cm²
 10 A

- 11 B
 12 a 565 cm² b 452 cm²
 13 a 113 cm² b $r = 3$ cm, $h = 18$ cm
 c 28 cm² d 368 cm² e 339 cm²

Exercise 2E – Volume of composite solids

- 1 a 178 cm² b 712 cm³
 2 a 700 cm³ b 3000 cm³ c 3720 cm³
 d 2.128 m³ e 12.75 m³ f 18 m³
 3 a 8 m³ b 2 m³ c 10 m³
 4 a 22 619 cm³ b 6032 cm³ c 28 651 cm³
 5 a 19 000.4 cm³ b 103.7 cm³
 c 157 724.9 cm³
 6 B
 7 D
 8 a 16 875 cm³ b 16.875 L
 9 a



- b 50 mL c 20
 10 a 8.64 m² b 86.4 m³
 11 a 8 cm b 332 cm³ c 35%
 12 5.76 g

10 Quick Questions 2

- 1 58.1 cm² 2 226.19 cm²
 3 129.2 cm² 4 452 cm²
 5 77.47 cm² 6 3710 m²
 7 2073 cm² 8 21.237 cm²
 9 2100.6895 cm³ 10 536 cm³

Exercise 2F – Error in measurement

- 1 a 1152 cm³ b 118.625 cm³
 2 a 0.05 cm b 181.5 cm²
 c 2.4 cm² d 1.3%
 3 a 4096 mm³ b 3723.875 mm³
 c 4492.125 mm³ d 9.7%
 e 1536 mm² f 1441.5 mm²
 g 1633.5 mm² h 6.3%
 4 a 302 cm³ b 212 cm³ c 414 cm³ d 37%
 5 24%
 6 a 11.5 m³ b 1.3 m³ c 11.1%
 d 24.6 m² e 1.8 m² f 7.3%
 7 a 382 L b 89 L c 23%
 8 a 39 032 cm³ b 7890 cm²
 c 60 cm × 40 cm × 20 cm
 d 23% e 11.5%
 9 a 27.72 m² b 28 L c 1 L
 10 a 17 m × 10 m b 170 m²
 c \$5142.50 d \$221.43

Chapter review

- 1 a 43.0 cm² b 8494.9 mm²
 c 2.3 m²
 2 a 2215.9 mm² b 18.1 m² c 323.2 cm²
 3 a 7147.1 mm² b 37.7 m² c 2723.8 cm²
 4 a 4241.2 mm² b 329.5 m² c 19.8 cm²

- 5 705 cm^2
 6 a 5.75 m^2 b 27 cm^2 c 1804.94 cm^2
 7 1722 m^2
 8 a 840 m^2 b 2672 m^2 c 5548 m^2
 9 4190 m^2
 10 2010 m^2
 11 a 747.7 cm^2 b 728.8 cm^2 c 11.7 m^2
 12 488 cm^2
 13 a 314 cm^2 b 72 m^2 c $76\,454 \text{ mm}^2$
 14 3.438 m^3
 15 a 5797 cm^3 b $14\,283 \text{ cm}^3$
 c 1260 cm^3
 16 5343.85 cm^3
 17 a 0.25 cm b 2145 cm^3 c 9.7%
 18 a 500 mL b 20%

Practice examination questions

- 1 D 2 B 3 A 4 C
 5 a 12.6 m^2 b 62.8 m^3 c $35\,300 \text{ L}$ d 151 m^2
 6 a 292 m^2 b $233\,600 \text{ m}^3$ c 6.25%

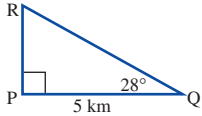
CHAPTER 3 Applications of trigonometry

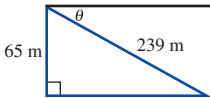
Are you ready?

- 1 a 14.26 m b 19.30 km c 20.62 m
 2 a 44° b 56° c 37°
 3 a 63° b 53° c 47°
 4 a 7.408 km b 27 M
 c 2222.4 m d 1.92 M
 5 a 32° b 46° c 7°
 6 a $x = 15$ b $x = 1.5$
 c $x = 14.25$ d $x = 22.5$

Exercise 3A – Review of right-angled triangles

- 1 a 12.2 cm b 110.9 mm c 10.0 m
 d 409.9 mm e 29.8 m f 19.3 cm
 2 a 27° b 56° c 57°
 3 62 m

- 4 a 
 b 2.659 km c 5.663 km

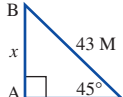
- 5 15°
 6 a  b 16°

- 7 a 28.01 m b 25°
 8 52°

Exercise 3B – Bearings

- 1 a  b 2.970 km

- 2 a  b 34 km

- 3 a  b 30.4 M
 c 56.3008 km

- 4 B 5 B 6 6.4 km
 7 a  b 13.9 M

- 8 437 km
 9 a  b 11.1 km

- 10 D 11 A
 12 a  b 229°

- 13 342°

Exercise 3C – Using the sine rule to find side lengths

1 a $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

b $\frac{x}{\sin X} = \frac{y}{\sin Y} = \frac{z}{\sin Z}$

c $\frac{p}{\sin P} = \frac{q}{\sin Q} = \frac{r}{\sin R}$

- 2 a 14.8 cm b 1.98 km c 112 mm

- 3 a 10.0 mm b 22.1 cm c 39.6 km

- 4 B

- 5 C

- 6 9.8 cm

- 7 27.0 m

- 8 37.8 m

- 9 a  b 43.2 m c 33 m

- 10 a $\angle WYX = 40^\circ$

In $\triangle WYX$ $\frac{80}{\sin 40^\circ} = \frac{XY}{\sin 30^\circ}$

$\therefore XY = \frac{80 \sin 30^\circ}{\sin 40^\circ}$

b In $\triangle YXZ$ $\sin 70^\circ = \frac{h}{XY}$

$\therefore h = \frac{80 \sin 30^\circ}{\sin 40^\circ} \times \sin 70^\circ$

- c 58.5 m

Exercise 3D – Using the sine rule to find angles

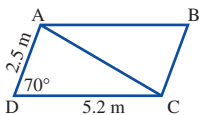
- 1 a 43° b 34° c 27°
 d 75° e 37° f 2°
 2 B 3 B 4 38°
 5 20° 6 84° b 63°
 7 a 57°
 8 54°

10 Quick Questions 1

- 1 26.9 m 2 157 mm 3 69.8 cm
 4 60° 5 860 mm 6 110 m
 7 15 cm 8 43° 9 50°
 10 32°

Exercise 3E – Area of a triangle

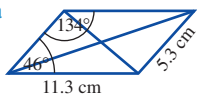
- 1 a Area = $\frac{1}{2}ab \sin C$ b Area = $\frac{1}{2}yz \sin X$
 c Area = $\frac{1}{2}am \sin G$
 2 a Area = $\frac{1}{2}ab \sin C$ b Area = $\frac{1}{2}bh$
 c Area = $\frac{1}{2}bh$ d Area = $\frac{1}{2}bh$
 3 a 42.4 cm^2 b 3522.6 mm^2 c 4660.9 mm^2
 4 a 133 cm^2 b 555.4 cm^2 c 608 cm^2
 5 D
 6 B
 7 3.865 cm^2
 8 a b 12.2 m^2



- 9 a 72° b 59 cm^2
 10 710 m^2

Exercise 3F – Using the cosine rule to find side lengths

- 1 a $a^2 = b^2 + c^2 - 2bc \cos A$
 b $r^2 = p^2 + q^2 - 2pq \cos R$
 c $n^2 = l^2 + m^2 - 2lm \cos N$
 2 a 8.05 m b 14.3 cm c 12.0 m
 3 a 185.1 cm b 14.4 m c 104.4 mm
 4 D 5 A 6 C
 7 14.4 cm 8 1140 mm 9 6.742 km
 10 40 m
 11 a b 8.5 cm c 15.5 cm

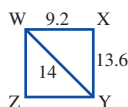


- 12 55 cm

Exercise 3G – Using the cosine rule to find angles

- 1 a $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$
 b $\cos Q = \frac{p^2 + r^2 - q^2}{2pr}$
 c $\cos P = \frac{a^2 + m^2 - p^2}{2am}$
 2 a 85° b 83° c 45°
 3 a 103° b 137° c 10°

- 4 A 5 D 6 42° 7 23°
 8 $81^\circ, 54^\circ, 44^\circ$ b 73°
 9 a



- 10 32°
 11 a 39° b 25°
 12 148°

10 Quick Questions 2

- 1 452 mm 2 0.782 m
 3 40° 4 $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
 5 12.7 m 6 32°
 7 $c^2 = a^2 + b^2 - 2ab \cos C$
 8 210 m 9 $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$
 10 49°

Exercise 3H – Radial surveys

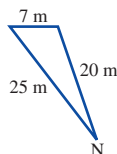
- 1 102 m
 2 a 286 m b 432 m c 540 m
 3 $12\,993 \text{ m}^2$
 4 a 4923 m^2 b 8861 m^2 c $18\,382 \text{ m}^2$
 5 a 85° b 75 m
 6 389 m
 7 a 214 m b 531 m c 301 m
 8 a 2719 m^2 b $12\,425 \text{ m}^2$ c 5809 m^2

Chapter review

- 1 a 8.6 cm b 13.6 km c 11.2 km
 2 a 61° b 66° c 45°
 3 3087 m
 4 a 106 m b 28°
 5 56.569 km
 6 21.7 km
 7 a 297° b 117°
 8 a 1.67 cm b 81.7 mm c 9.81 km
 9 12.4 cm
 10 a 52° b 21° c 68°
 11 809 cm^2
 12 3000 m^2
 13 a 8.64 m b 8.80 m c 11.8 cm
 14 84.0 cm
 15 985 m
 16 a 60° b 112° c 139°
 17 34°
 18 29°
 19 a 284 m b 4020 m^2
 20 a 783 m b $34\,910 \text{ m}^2$

Practice examination questions

- 1 D 2 B 3 A 4 D
 5 a b 13°



6 a 15°

$$b \text{ In } \triangle ABT \quad \frac{BT}{\sin 20^\circ} = \frac{30}{\sin 15^\circ} \therefore BT = \frac{30 \sin 20^\circ}{\sin 15^\circ}$$

$$c \text{ In } \triangle TBC \quad \sin 35^\circ = \frac{h}{BT}$$

$$\therefore h = BT \times \sin 35^\circ$$

$$h = \frac{30 \sin 20^\circ}{\sin 15^\circ} \times \sin 35^\circ$$

d 22.7 m

7 a 100.3 m b 1625 m²

CHAPTER 4 Interpreting sets of data

Are you ready?

1 a Mean = 5 b Mean = 19.5

c Mean = 3.31

2 a 3 b 12 and 30 c 3

3 a Median = 4.5 b Median = 17

c Median = 3

4 a 6 b 21 c 4

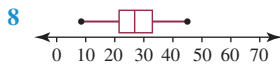
5 a 3.5 b 15 c 1

6 a Sample standard deviation = 1.32

b Population standard deviation = 1.41

7 Key: 1 | 9 = 19

Stem	Leaf
0	9
1	1 4 5 9 9
2	0 1 2 2 3 3 6 6 7 7 7 8 8
3	0 1 2 2 3 4 7 8 9
4	0 0 1 5



Exercise 4A — Measures of location and spread

1 a 1.6 b 1

2 a Mean = 49, median = 44, mode = no mode

b Mean = 3.4, median = 3.5, mode = 1

c Mean = 9.575, median = 9.7, mode = 9.8, 9.9

d Mean = 15.2, median = 15, mode = 13, 15

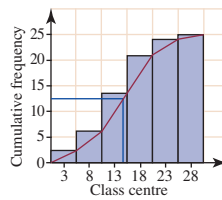
3 a 6.5 b 6.5 c 7

4 a

Score	Class centre	Frequency	Cumulative frequency
1–5	3	2	2
6–10	8	4	6
11–15	13	8	14
16–20	18	7	21
21–25	23	3	24
26–30	28	1	25

b 14.6

c

Median ≈ 14

5 a 7

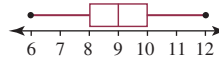
b 1

c Mean = 27.3, $\sigma_n = 1.7$

6 a 6

b i 9 ii Lower quartile = 8, upper quartile = 10
iii 2c i Mean = 9.04 ii $\sigma_n = 1.44$

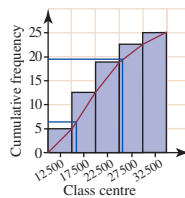
d



7 a

Crowd	Class centre	Frequency	Cumulative frequency
10 000–15 000	12 500	5	5
15 000–20 000	17 500	8	13
20 000–25 000	22 500	6	19
25 000–30 000	27 500	4	23
30 000–35 000	32 500	3	26

b



c 9500

d $\bar{x} = 21\ 000$, $\sigma_n = 6300$

8 a Team A = 16, Team B = 16

b i Team A = 10, Team B = 40

ii Team A = 4, Team B = 20

iii Team A = 3.1, Team B = 12.5

c Both teams had the same mean score. However, Team A was more consistent as shown by a lower reading in all three measures of spread.

9 B

10 A

11 A

12 C

13 a i 80

ii 80

iii 80

b i 70

ii 79

iii 80

c The outlier had a great effect on the mean, a small effect on the median and no effect on the mode.

14 The outlier will greatly increase the mean.

15 A

16 a Mean = \$647.00

Median = \$397.50

Mode = \$397.50

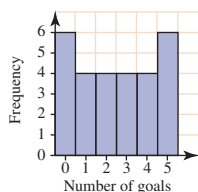
b i Increase ii None iii None

c i The median or mode as it is a lower figure, making it look as though they deserve a rise.

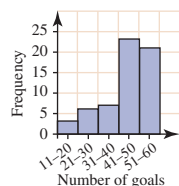
ii The mean as it is a much greater figure, making it look as though the employees are well paid.

Exercise 4B – Skewness

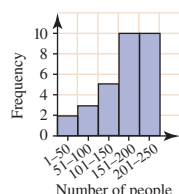
- 1 a Yes b 3 c Yes, both equal 3
2 a No b 5–9 and 20–24 c No
3 a



- c 0 and 5
4 a 1–2 d Yes, both equal 2.5
5 a Negatively skewed b Positively skewed
c Positively skewed b Symmetrical
6 a Positively skewed b Negatively skewed
7 a b Negatively skewed



- 8 A
10 a

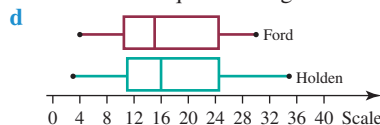


- c 151–200 and 201–250
d Negatively skewed
11 a Chemistry is symmetrical.
b Maths is negatively skewed.
c Chemistry: mode = 41–50 and 81–90,
Maths: mode = 71–80
d Maths, because there are more scores further away from the centre of the distribution.
12 Check with your teacher.
10 Quick Questions 1
1 23.3 2 21.5 3 16
4 29 5 5 6 7.93
7 Positively skewed 8 Yes, 45 is an outlier.
9 Median, because the outlier inflates the mean.
10 The outlier makes the range very large. The outlier also affects the mean. There is no change to the IQR.

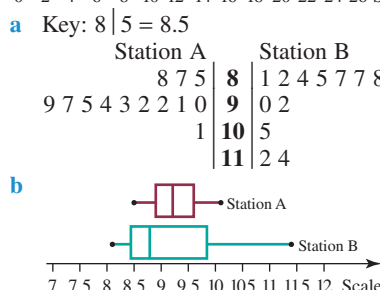
Exercise 4C – Displaying multiple data sets

- 1 Key: 1.5 | 5 = 1.55
Boys Girls
9 9 7 | 1.5 | 1 2 5 6 7 8 8
9 8 6 6 5 5 4 0 | 1.6 | 4 4 6 7 8 9 9
4 4 2 1 | 1.7 | 0
2 Key: 1 | 8 = 18
Team A Team B
8 | 0 | 7 9
9 8 7 | 1 |
9 5 4 3 | 2 | 0 1 3 4 7
4 2 | 3 | 0 5 8
2 0 | 4 | 1 6

- 3 a Ford: median = 15, Holden: median = 16
b Ford: range = 26, Holden: range = 32
c Ford: interquartile range = 14,
Holden: interquartile range = 13.5



- 4
5 a Key: 8 | 5 = 8.5
Station A Station B
8 7 5 | 8 | 1 2 4 5 7 7 8 9
9 7 5 4 3 2 2 1 0 | 9 | 0 2
1 | 10 | 5
11 | 2 4



- 6 a Team A
b Team A: range = 60, Team B: range = 90
c Team A: interquartile range = 13,
Team B: interquartile range = 11

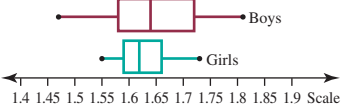
- 7 a
b Emad: range = 35, Larry: range = 24
c Emad: interquartile range = 12,
Larry: interquartile range = 14

- 8 C
9 a July b 13° c 21.7°
10 a Supermarket X, range = 111
Supermarket Y, range = 90

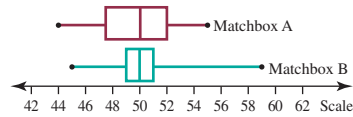
- b Both supermarkets follow a similar pattern. There are very few customers from midnight to 6 am. Then the number peaks between 10 am and noon, remaining fairly constant until 8 pm, when the number reduces.

Month	Sydney	Melbourne	Brisbane
January	12	8	13
February	12	7	14
March	13	9	15
April	12	12	11
May	12	14	10
June	12	14	8
July	10	15	7
August	10	16	7
September	10	15	7
October	12	14	9
November	11	12	10
December	12	11	12

Exercise 4D – Comparison of data sets

- 1 a English 66, Maths 63.5
b English 32, Maths 53
c The marks are more spread in Maths than in English.
- 2 a 
b Boys 1.64, girls 1.62
c Boys 0.34, girls 0.18
d Boys 0.14, girls 0.07
e The spread of heights is much greater among boys than among girls.
- 3 a Year 7: range = 0.4, Year 12: range = 0.26
b Year 7: interquartile range = 0.15, Year 12: interquartile range = 0.11
c The range of heights is greater in Year 7 as shown by the range and the IQR. The heights become less spread by the time they get to Year 12.
- 4 The pattern of software sales follows after the pattern of hardware sales with a slight time delay.
- 5 a Southern
b Western
c Similar peaks and troughs
- 6 a 43.2%
b 1.9%
c 0.9%
d 2.6%
e More evident in males with three times the number of drivers over the limit
- 7 a 90.5% b 55.6%
c Yes, as a much greater percentage of games are won with Ashley playing.
- 8 a 9.5% b 9.7%
c i 48.7% ii 51.3%
d There is no significant difference between the city and country results.
- 9 a Chemistry, 69.25
b Physics, because of the lower standard deviation
- 10 a Point A: $\bar{x} = 61$, $\sigma_n = 4.27$, Point B: $\bar{x} = 58.8$, $\sigma_n = 12.06$
b Point A because of the higher mean
c Point B because of the greater standard deviation
- 11 a Aaron: $\bar{x} = 38.1$, Sunil: $\bar{x} = 39.3$
b Aaron: range = 76, Sunil: range = 65
c Aaron: interquartile range = 16, Sunil: interquartile range = 57
d Aaron is more consistent because although he has a larger range this is caused by one outlier. Aaron's interquartile range is much less, showing his consistency.
- 12 C (based on the interquartile range)
- 13 B
- 14 A

15 a



- b Machine A: $\bar{x} = 49.96$, $s_n = 2.90$, Machine B: $\bar{x} = 50.12$, $s_n = 2.44$
- c Machine B has a lower standard deviation and so is more dependable.

Chapter review

1 a 25.4

b 26

2 a

Number of house calls	Frequency	Cumulative frequency
0	1	1
1	6	7
2	8	15
3	9	24
4	6	30
5	2	32

b 2.593 75

c 3

d 3

3 a 80.6

b 84

c 20

d 24.4

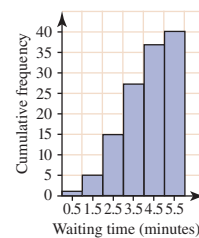
4 $\bar{x} = 10.3$ $\sigma_n = 1.6$

5 a

Waiting time	Class centre	Frequency	Cumulative frequency
0–1 minute	0.5	1	1
1–2 minutes	1.5	4	5
2–3 minutes	2.5	10	15
3–4 minutes	3.5	13	28
4–5 minutes	4.5	9	37
5–6 minutes	5.5	3	40

b $\bar{x} = 3.35$ $\sigma_n = 1.17$

c



d 1.75

6 a 29.5

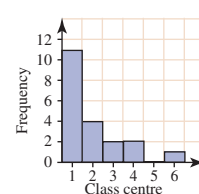
b 34.5

c Outlier reduces the mean greatly.

7 a Yes b Both are 17.5.

c 17 and 18

8 a



b Positively skewed

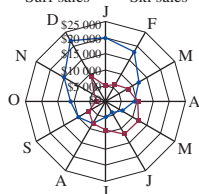
- 9 A histogram that shows more columns to the right of centre than to the left.

- 10 a Key: $5 \mid 6 = 56$

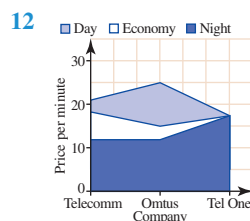
English	Maths
5	4
7 6 6 2	5
8 7 6 6 5 4 0	6
7 7 4 4	7
4 2 0	8
1	9

- b English: median = 66.5, Maths: median = 66
 c English: range = 46, Maths: range = 50
 d English: interquartile range = 18.5, Maths: interquartile range = 11.5

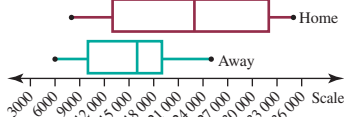
- 11 a — Surf sales — Ski sales



- b There is a peak in surf sales through summer, while the ski sales are greatest in winter, with a short peak occurring around Christmas.



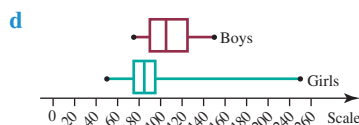
- 13 a Home: 23 000 Away: 16 000
 b Home: 27 000 Away: 19 000
 c Home: 19 000 Away: 9000
 d



- 14 a 2003: median = 7, 2004: median = 8
 b 2004
 c 2003
 d 2004 — Higher median, lower limit, lower quartile and upper limit
 15 a 9.7% b 8.0%
 c No significant difference
 16 a English: $\bar{x} = 71$, maths: $\bar{x} = 69.3$
 b English: range = 43, maths: range = 37
 c English: $\sigma_n = 11.6$, maths: $\sigma_n = 12.0$
 d English, because of the lower standard deviation

Practice examination questions

- 1 B, C and D 2 A 3 C
 4 B 5 B
 6 a Boys: median = \$105, Girls: median = \$85
 b Boys: range = 75, Girls: range = 200
 c Boys: interquartile range = 35, Girls: interquartile range = 20



- e Boys: $\bar{x} = \$107$, $\sigma_n = 22.4$, Girls: $\bar{x} = \$97$, $\sigma_n = 53.1$
 f Generally, the girls' is more consistent. The range and standard deviation for the girls is inflated by the outlier so the best measure of consistency is the interquartile range which is lower for the girls.
 7 a Sharks: median = 24, Bulldogs: median = 24
 b Bulldogs' scores are more clustered around the median and so can be seen to be more consistent.
 c Negatively skewed
 d $\bar{x} = 23.96$, $\sigma_n = 5.58$

CHAPTER 5 Algebraic skills and techniques

Are you ready?

- 1 a 2300 b 161.2 c 3120 d 375.9
 2 a $5r$ b $10m$ c $16x + 15$
 d $a - 5b$ e $4y - x$ f $9m - 8n$
 3 a r^{10} b $18a^3$ c $28p^6$
 d $35q^6$ e $48m^6$ f $27r^3s^{11}$
 4 a d^4 b $6m^4$ c $42x^5$
 d $2q^5$ e $8s^5$ f $\frac{k^2}{8}$
 5 a a^8 b $64b^3$ c $16c^8$
 6 a $z = 118$ b $y = 24$ c $w = 13$
 d $v = 5\frac{1}{3}$ e $t = 14$ f $n = 34$
 7 a 2.5×10^4 b 2.36×10^8
 c 4×10^5 d 2.6×10^{13}

Exercise 5A — Substitution

- 1 32.16
 2 a 30.75 b 2327.5 c 27.1
 d 120 e -154
 3 26.4
 4 29.8 m
 5 181.5
 6 a 1.41 b 12.06 c 137.26
 d 82.8 e 254.04
 7 126 cm^2
 8 101.25
 9 6.3
 10 a 15 b 16.2 c 8.5
 d 6.0 e 30.5
 11 5.2 cm
 12 a 10.5 b 16.0 cm^2

Exercise 5B — Algebraic manipulation

- 1 a $12a$ b $18b$ c $14c$
 d $41d$ e $4e$ f f
 g $-7g$ h $5h$ i $-9i$
 j $11j$ k $4k$ l $-2l$
 2 a $11m - 9$ b $8n - 4$ c $10p^2 + 4p$
 d $3r + 11s$ e $3t - 6$ f $-u - 6v$
 g $6w^2 - 4w^3$ h $5xz - xy$ i $5p^2 - 16$
 j $10x + 4y - 6xy$

- 3 a a^{13} b b^4 c $12c^7$
 d $7d^4$ e $12p^9q^5$ f $63g^3h^4$
 g $28m^6n^5$ h $20p^5q^4$ i $24x^3y^3z$
 j $48u^4v^5w^9$
- 4 a k^3 b $3m^5$ c $6n^5$
 d $2x^4$ e $8m^2n^2$ f $5x^5$
 g m^5n^6 h $\frac{8p^3}{q^3}$ i $\frac{11a}{b}$
 j $4qr^4$
- 5 a a^{12} b $4b^8$ c $27m^6$
 d $16x^4y^6$ e $16p^4q^8$
- 6 a $2m + 10$ b $x^2 + 2x$
 c $9a^2 + 6ab$ d $18q^6 - 6q^2$
 e $5mn - 25n^2$ f $14a^6b^4 - 21a^2b^{10}$
 g $-3d - 15$ h $-3m^2 + 6mn$
 i $-12r^3 + 18r^6$ j $18p^2q^2r - 6pqr^2$
- 7 a $10x + 6$ b $a^2 + 13a - 10$
 c $2m^2 + 4mn - 12n^2$ d $18x - 45$
 e $4p^2 - 15p + 30$ f $7x^2y - 8xy^2 - xy$
- 8 a a^7 b m^3 c $16mn^5$
 d $10xy^{11}$ e 1 f m

10 Quick Questions 1

- 1 10 2 101.87
 3 15.3 4 $-5x$
 5 $a - 6b$ 6 $15b^6$
 7 $6g^3h^2$ 8 $25p^6q^8$
 9 $10x - 5x^2$ 10 $6a^2 - 19ab + 24b^2$

Exercise 5C — Equations and formulas

- 1 12.7 cm
 2 38 m
 3 a 7.3 b 12.4 c 4.1 d 26 e 20.4
 4 ± 5
 5 10.22 cm
 6 a 0.75 b 2.20 c 3.19 d 4.70 e 0.6
 7 $x = \frac{y-1}{2}$
 8 $l = \frac{A}{b}$
 9 a $a = \frac{2A}{h} - b$ b $h = \frac{2A}{a+b}$
 10 $r = \pm \sqrt{\frac{A}{\pi}}$
 11 a $m = \frac{E}{c^2}$ b $c = \pm \sqrt{\frac{E}{m}}$
 12 D 13 B 14 D
 15 a $r = \pm \sqrt{\frac{V}{\pi}}$ b $u = \pm \sqrt{v^2 - as}$
 c $r = \sqrt[3]{\frac{3V}{4\pi}}$ d $L = g\left(\frac{T}{2\pi}\right)^2$
 e $a = \pm \sqrt{c^2 - b^2}$

Exercise 5D — Solution by substitution

- 1 $x = 6.6$ 2 $x = 7$ 3 $x = 7$ 4 $n = 14$
 5 a $500\,000 = 265\,000(1.04)^n$ b 16 years
 6 5 years

7 a	t	1	2	3	4	5	6	7	8	9	10
	d	5	20	45	80	125	180	245	320	405	500

b 8 seconds

8 a	Length	5	10	15	20	25	30	35
	Width	35	30	25	20	15	10	5
	Area	175	300	375	400	375	300	175

b $20\text{ m} \times 20\text{ m}$

c $40\text{ m} \times 20\text{ m}$

10 Quick Questions 2

- 1 10 2 32
 3 3 4 127.3
 5 ± 20 6 $a - 3b$
 7 $20x^7y^4$ 8 $64m^9n^{12}$
 9 $3mn^2$ 10 $x = 12$

Exercise 5E — Scientific notation

- 1 a 9×10^4 b 2×10^{10} c 7×10^2
 2 a 1.458×10^6 b 2.365×10^{13} c 2.589×10^3
 3 a 2×10^{-8} b 4.57×10^{-3} c 4.9321×10^{-11}
 4 a $9.32 \times 10^7\text{ km}$ b $7.85 \times 10^{10}\text{ mm}$
 c $4.59 \times 10^4\text{ t}$ d $3.65 \times 10^{-3}\text{ g}$
 e $2.14 \times 10^{-1}\text{ mL}$ f $5.69 \times 10^{-6}\text{ s}$
 5 a 34 000 b 2 870 000
 c 30 248 000 000
 6 a 0.000 585 b 0.000 001 97
 c 0.001 002
 7

Planet	Distance (AU)	Distance in km (Scientific notation)
Mercury	0.39	5.85×10^7
Venus	0.72	1.08×10^8
Earth	1.0	1.50×10^8
Mars	1.52	2.28×10^8
Jupiter	5.20	7.80×10^8
Saturn	9.54	1.43×10^9
Uranus	19.18	2.88×10^9
Neptune	30.06	4.51×10^9

- 8 a $2.35 \times 10^4\text{ m}$ b $8.4 \times 10^4\text{ km}$
 c $6.4 \times 10^6\text{ mm}$ d $6.58 \times 10^3\text{ t}$
 e $7.802 \times 10^9\text{ kg}$ f $8.29 \times 10^{13}\text{ g}$
 g $1.87 \times 10^5\text{ kL}$ h $2.178 \times 10^{10}\text{ L}$
 i $5.55 \times 10^{10}\text{ mL}$

Chapter review

- 1 162
- 2 36.952
- 3 13
- 4 a 136.00 b 37.78 c 8.57 d 8
- 5 a $5m$ b $16q$ c $12p$
d t e $4m + 4n$ f $4x - 5$
g $3k - 2l$ h $8x^2 + 14x$ i $ab + 7a - 2b$
- 6 a $28a^9$ b $45b^2$ c $21g^4h^8$
d $12m^6n^7$ e $6x^2$ f $8s^3$
g $7q$ h $27p^6q^{12}$ i $4m^2$
- 7 a $2a + 18$ b $2p^2 - 4p$
c $-3x^5 + x^2$ d $12m^7 - 8m^5n$
e $-16xy + 4xy^2$ f $12a^5b^3 - 24a^2b^5$
- 8 a $8m + 40$ b $2p^2 - 3p$
c $11x - 52$ d $7yz + 8y^2 - 6z^2$
e $2p^2q - 4pq^2 + 8p$
- 9 15 10 21.6 m 11 $s = \pm 6$ 12 7.2 cm
- 13 a $x = 2.9$ b $x = 3.8$ c $x = 4.8$
- 14 8 years
- 15 3 years
- 16 a 6×10^5 b 2×10^{-10}
c 7.892×10^{13} d 1.25×10^{-3}
e 4.589×10^{-6} f 1.24589×10^{14}
- 17 a 1.26×10^4 b 1.25×10^{-4}
c 3.21×10^{-2} d 5.86×10^8
e 1.24×10^4 f 5.19×10^{-8}
- 18 a 250 b 38 700
c 98 504 000 d 0.289
e 0.000 000 367 02 f 0.0011
- 19 a 2.5×10^8 mm b 2.8×10^5 kg
c 3.43×10^7 L d 1.45×10^3 km
e 4.243×10^{10} kg f 1.3×10^5 L

Practice examination questions

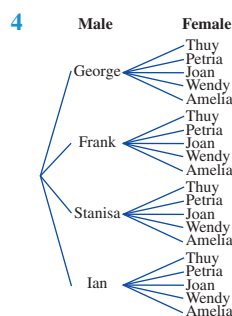
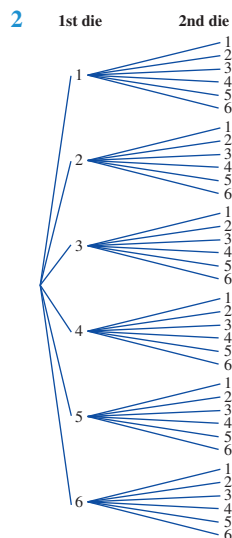
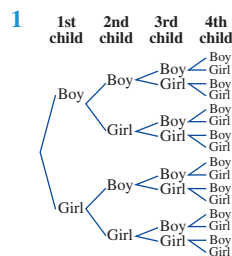
- 1 A 2 A 3 A
- 4 B 5 A
- 6 a 304.8 cm^3 b 8.3 cm
c 6.4 cm d $h = \frac{SA - 2\pi r^2}{2\pi r}$
- 7 a $n = 10$ b $(0.85)^n = 0.5$
c $n = 4.3$

CHAPTER 6 Multi-stage events

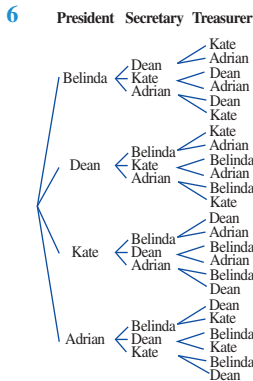
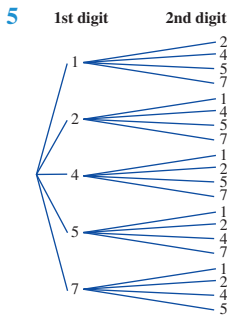
Are you ready?

- 1 a {hearts, diamonds, spades, clubs}
b {red, blue, white}
c {a, b, c, ... x, y, z}
- 2 a Unlikely b Probable c Impossible
- 3 a Equally likely b Equally likely
c Impossible
- 4 a 500 b 240 c 45 697 600
- 5 a $\frac{1}{8}$ b $\frac{1}{50}$ c $\frac{3}{14}$
- 6 a Selecting a consonant
b Selecting a white or clear marble
c Selecting a number greater than 9
- 7 a $\frac{3}{5}$ b $\frac{1}{5}$ c 0.27

Exercise 6A – Tree diagrams



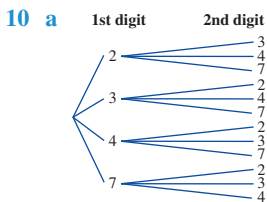
$S = \{\text{George - Thuy, George - Petria, George - Joan, George - Wendy, George - Amelia, Frank - Thuy, Frank - Petria, Frank - Joan, Frank - Wendy, Frank - Amelia, Stanisa - Thuy, Stanisa - Petria, Stanisa - Joan, Stanisa - Wendy, Stanisa - Amelia, Ian - Thuy, Ian - Petria, Ian - Joan, Ian - Wendy, Ian - Amelia}\}$



7 $S = \{357, 358, 375, 378, 385, 387, 537, 538, 573, 578, 583, 585, 735, 738, 753, 758, 783, 785, 835, 837, 853, 857, 873, 875\}$

8 C

9 $\frac{1}{2}$



b $\frac{7}{12}$

11 a $\frac{1}{20}$ b $\frac{3}{10}$ c $\frac{2}{5}$ d $\frac{3}{5}$

12 $\frac{1}{4}$

13 B

14 a $S = \{\text{Bris} - \text{Peak} - \text{Ec}, \text{Bris} - \text{Peak} - \text{BC}, \text{Bris} - \text{Peak} - \text{FC}, \text{Bris} - \text{Off-peak} - \text{Ec}, \text{Bris} - \text{Off-peak} - \text{BC}, \text{Bris} - \text{Off-peak} - \text{FC}, \text{GC} - \text{Peak} - \text{Ec}, \text{GC} - \text{Peak} - \text{BC}, \text{GC} - \text{Peak} - \text{FC}, \text{GC} - \text{Off-peak} - \text{Ec}, \text{GC} - \text{Off-peak} - \text{BC}, \text{GC} - \text{Off-peak} - \text{FC}, \text{Cairns} - \text{Peak} - \text{Ec}, \text{Cairns} - \text{Peak} - \text{BC}, \text{Cairns} - \text{Peak} - \text{FC}, \text{Cairns} - \text{Off-peak} - \text{Ec}, \text{Cairns} - \text{Off-peak} - \text{BC}\}$

b i $\frac{3}{8}$ ii $\frac{1}{4}$ iii $\frac{1}{8}$

Exercise 6B – Counting techniques

- 1 a 6 b 120 c 362 880
 2 24 3 120 4 6
 5 720 6 12 7 12 144
 8 35 9 210 10 15
 11 72 12 C 13 D
 14 B
 15 a 20 b 6
 16 a 362 880 b 504 c 36

Exercise 6C – Probability and counting techniques

- 1 $\frac{1}{24}$
 2 a 120 b $\frac{1}{120}$ c $\frac{1}{120}$
 3 a $\frac{1}{6}$ b $\frac{2}{3}$ c $\frac{2}{3}$
 4 $\frac{1}{10}$
 5 a $\frac{1}{42}$ b $\frac{1}{42}$ c $\frac{1}{21}$
 6 a $\frac{1}{72}$ b $\frac{2}{9}$ c $\frac{2}{9}$
 7 $\frac{1}{6}$
 8 a $\frac{1}{13\ 800}$ b $\frac{1}{2300}$
 9 a 20 b $\frac{1}{20}$
 10 a $\frac{1}{10}$ b $\frac{3}{10}$ c $\frac{3}{5}$

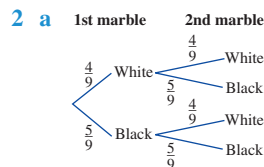
10 Quick Questions 1

- 1 $S = \{\text{HH}, \text{HT}, \text{TH}, \text{TT}\}$
 2 36 3 120 4 3 628 800
 5 720 6 72 7 70
 8 24 9 1680

10 An ordered selection occurs when the order in which each choice is made is important but in an unordered selection, order is not important.

Exercise 6D – Probability trees

1 $\frac{25}{64}$



b $P(WW) = \frac{16}{81}$ $P(WB) = \frac{20}{81}$

$P(BW) = \frac{20}{81}$ $P(BB) = \frac{25}{81}$

3 a $\frac{6}{25}$ b $\frac{12}{25}$
 4 a 51.2% b 38.4%

5 a $\frac{1}{20}$ b $\frac{1}{495}$ c $\frac{893}{990}$ d $\frac{19}{198}$

6 C

7 B

8 a $\frac{1}{15}$ b $\frac{7}{15}$ c $\frac{8}{15}$ d $\frac{7}{15}$

9 a $S = \{\text{BB}, \text{BG}, \text{GB}, \text{GG}\}$

b i $\frac{14}{39}$ ii $\frac{5}{39}$ iii $\frac{20}{39}$

10 a $\frac{24}{49}$ b $\frac{25}{49}$

11 a $\frac{2}{21}$ b $\frac{3}{7}$ c $\frac{10}{21}$

12 a 0.3025 b 0.2025

13 a 40.96% b 59.04%

14 0.01

15 a $\frac{624}{625}$ b $\frac{369}{625}$

16 D

- 17 a $\frac{1}{2}$ b $\frac{1}{5}$ c $\frac{1}{2}$
 18 $\frac{3}{10}$
 19 a 0.32 b 0.56 c 0.88

Chapter review

- 1 a 1st coin 2nd coin
-
- b $S = \{HH, HT, TH, TT\}$
 2 a $S = \{57, 58, 59, 75, 78, 79, 85, 87, 89, 95, 97, 98\}$
 b $S = \{55, 57, 58, 59, 75, 77, 78, 79, 85, 87, 88, 89, 95, 97, 98, 99\}$
 3 a $\frac{1}{8}$ b $\frac{3}{8}$ c $\frac{1}{2}$
 4 a $S = \{46, 47, 48, 49, 64, 67, 68, 69, 74, 76, 78, 79, 84, 86, 87, 89, 94, 96, 97, 98\}$
 b i $\frac{1}{20}$ ii $\frac{2}{5}$ iii $\frac{3}{4}$
 5 a $\frac{1}{2}$ b $\frac{3}{4}$
 6 40 320
 7 56
 8 70
 9 a 120 b 60
 10 $\frac{1}{120}$
 11 a 12 b $\frac{1}{12}$
 12 a 360 b $\frac{1}{360}$ c 15 d $\frac{1}{15}$ e $\frac{1}{3}$
 13 a $\frac{1}{1024}$ b $\frac{1}{1048576}$
 14 a $\frac{3}{10}$ b $\frac{1}{10}$
 15 $\frac{2}{5}$
 16 a $\frac{8}{125}$ b $\frac{98}{125}$
 17 91%
 18 $\frac{343}{512}$

Practice examination questions

- 1 C
 2 D
 3 C
 4 B
 5 a 1st coin 2nd coin 3rd coin
-
- b $\frac{3}{8}$ c $\frac{7}{8}$
 6 a 1st shot 2nd shot
-
- b i 0.16 ii 0.48 iii 0.64

CHAPTER 7 Applications of probability

Are you ready?

- 1 a $\frac{2}{3}$ b $\frac{1}{50}$ c $\frac{49}{99}$
 2 First digit Second digit Sample space
-
- 3 a First time Second time b $\frac{1}{25}$
-

Exercise 7A — Expected outcomes

- 1 20 2 50 3 25
 4 a 35 b 28 c 7
 5 1.25
 6 a 25 b 50 c 7.69 d 30.77 e 1.92
 7 a $\frac{1}{25}$ b 2.08
 8 a 0.0144 b 48.9
 9 B 10 B 11 5
 12 a 90 b 90 c 30
 13

Outcome	2	3	4	5	6	7	8	9	10	11	12
Probability	$\frac{1}{36}$	$\frac{1}{18}$	$\frac{1}{12}$	$\frac{1}{9}$	$\frac{5}{36}$	$\frac{1}{6}$	$\frac{5}{36}$	$\frac{1}{9}$	$\frac{1}{12}$	$\frac{1}{18}$	$\frac{1}{36}$
Expected no.	2.8	5.6	8.3	11.1	13.9	16.7	13.9	11.1	8.3	5.6	2.8

- 14 a 55.26 b 60.53 c 39.47 d 94.74

Exercise 7B — Financial expectation

- 1 \$0.00 2 \$0.40 3 $-\$0.50$
 4 \$0.15 5 $-\$0.30$ 6 \$1.70
 7 a 37
 b i 18 ii 18 iii 1
 c $-\$0.27$
 8 A 9 C 10 \$0.11 11 $-\$1.10$

10 Quick Questions 1

- 1 20 2 25 3 50 4 7.7
 5 30.8 6 \$0.17 7 $-\$0.11$
 8 The player can expect to have an average profit of 20% per game.
 9 The player can expect to have an average loss of 20% per game.
 10 \$0.45

Exercise 7C — Two-way tables

	Test results		Total
	Accurate	Not accurate	
With virus	98	2	100
Without virus	388	12	400
Total	486	14	

	Test results		Total
	Accurate	Not accurate	
Telling truth	777	23	800
Telling lies	156	44	200
Total	933	67	

- 3 a 1000 b 75 c 96.7% d $\frac{3}{5}$
 4 a 200 b 44 c 90.9% d 5.1%
 e 94%
 f A range of factors should be considered, e.g. for an expensive system a 6% fail rate might be unsatisfactory.

5 B 6 D 7 A

	Test results		Total
	Accurate	Not accurate	
Bags with prohibited items	48	2	50
Bags with no prohibited items	145	5	150
Total	193	7	

b i 96% ii 3.3% iii 4% iv 96.5%

Chapter review

- 1 18
 2 a 10 b 30 c 20
 3 a 50 b 25 c 7.69 d 30.8 e 3.85
 4 a 2.5 b 15 c 7.5 d 15 e 25
 5 a 12.5 b 37.5 c 50
 6 a 5 b 45 c 15
 7 \$0.00
 8 -\$0.60
 9 A positive financial expectation means that on average a profit should be made while a negative financial expectation means that on average a loss should be made.
 10 -\$0.03
 11 \$0.00
 12 \$0.30
 13 \$1.87

	Test results		Total
	Accurate	Not accurate	
With virus	48	2	50
Without virus	149	1	150
Total	197	3	

	Test results		Total
	Accurate	Not accurate	
Telling truth	77	3	80
Telling lies	17	3	20
Total	94	6	

- 16 a 140 b 30 c 90% d $\frac{1}{10}$
 17 a 130 b 33.8% c $\frac{39}{40}$

Practice examination questions

- 1 C 2 B 3 A
 4 a $\frac{1}{6}$ b 15 c $\frac{1}{18}$ d \$0.11
 5 a 200 b 96% c 34 d $93\frac{1}{3}\%$ e $\frac{14}{15}$

CHAPTER 8 Annuities and loan repayments

Are you ready?

- 1 a $n = 5, r = 0.08$ b $n = 8, r = 0.03$
 c $n = 12, r = 0.019$ d $n = 120, r = 0.008$
 e $n = 30, r = 0.00066$
 2 a \$5000 b \$7626 c \$5922
 3 a \$2292.19 b \$16 808.55 c \$18 499.35
 4 a \$8984 b \$15 750 c \$22 716

Exercise 8A — Future value of an annuity

- 1 \$7049.37
 2 a \$6691.13 b \$16 859.14
 c \$6158.56 d \$3974.56
 e \$17 713.21 f \$3530.21
 3 \$4472.93
 4 a i \$2295.05 ii \$2217.44 iii \$2142.45
 iv \$2070.00 b \$10 724.94
 5 \$73 105.94
 6 a 22 b \$21 696.15
 c \$283 057.94
 7 a \$25 155.79 b \$29 333.00
 c \$433 046.81 d \$217 372.57
 e \$114 665.87
 8 a 5
 b No — she has saved \$29 041.96.
 c \$4041.96
 9 \$90 237.49
 10 a \$20 326.23 b \$24 297.37
 c \$45 881.32 d \$69 770.03
 11 A 12 C 13 \$4067.23

- 14 a \$4524.37 b \$7068.59 c \$1930.08
15 a \$56 160 b \$112 320 c \$242 106.74

10 Quick Questions 1

- 1 \$8857.81 2 \$1179.42 3 \$10 164.56
4 \$195 857.88 5 \$31 741.41 6 \$66 574.26
7 \$3626.32 8 \$5980.14 9 \$558.24
10 \$891.50

Exercise 8B — Present value of an annuity

- 1 \$7537.11
2 a \$12 418.43 b \$3786.09 c \$94 222.37
3 \$48 987.91
4 a \$37 685.57 b \$35 644.50
c \$34 623.58 d \$33 943.00
5 \$3511.79
6 a \$11 257.78 b \$6116.69
c \$14 783.59 d \$24 767.78
7 \$22 851.87
8 \$6113.60
9 A 10 D
11 Investment A
12 C
13 a \$15 864.53
b Yes, Kylie will have \$32 547.59.

Exercise 8C — Future and present value tables

- 1 \$4787.76
2 a \$1324.00 b \$23 932.35
c \$7503.81 d \$62 953.50
3 a 4% b 10 c \$6003.05
4 a \$4103.92 b \$5535.38 c \$7546.74
5 5% for 6 years. \$1 will grow to \$6.8019 but at 6% for 5 years it will grow to \$5.6371.
6 D
7 \$6918.50
8 a \$1845.09 b \$12 289.20
c \$4455.79 d \$16 604.40

10 Quick Questions 2

- 1 \$15 937.42 2 \$15 937.42 3 \$13 537.79
4 \$1435.91 5 \$5084.04 6 \$19 277.16
7 \$22 094.93 8 \$8513.56 9 \$10.63
10 \$13 295.75

Exercise 8D — Loan repayments

- 1 \$2637.97
2 \$210.67
3 a \$94.15 b \$311.38 c \$859.72
d \$484.17 e \$1511.14
4 \$1397.37
5 a \$375 b \$3375 c \$107.32
6 \$374.53
7 a \$28 000 b \$138.21
8 \$16 847.35
9 a \$4359.36 b \$29 059.20
c \$98 285.40 d \$366 700.80
10 D
11 B
12 9 years, 3 months
13 a \$1320.99 b \$396 297.00
c 14 years, 6 months d \$117 897

Chapter review

- 1 a \$4917.25 b \$2960.49
c \$31 053.57 d \$5461.06
2 \$16 398.20
3 a \$66 666.94 b \$31 371.42
c \$14 291.59 d \$247 313.84
4 \$36 604.24
5 \$3088.13
6 a \$3793.40 b \$468.93 c \$217.69
7 \$20 057.99
8 a \$6139.13 b \$4298.72
c \$3219.64 d \$36 945.53
9 \$11 654.84
10 \$5113.34
11 a \$524 573.59 b \$13 002.83
12 \$41 039.20
13 a \$4399.95 b \$34 641.25
c \$1842.84 d \$51 014.25
14 \$2242.95
15 a \$1516.32 b \$14 047.20
c \$4055.45 d \$11 177.64
16 \$547.41
17 a \$553.76 b \$26 580.48
18 \$503 055
19 a \$226.10 b \$5426.40 c \$1026.40

Practice examination questions

- 1 D 2 B 3 B 4 D
5 a \$91 523.93 b \$19 636.30 c \$5362.05
6 a \$63 792.85 b \$2384.89 c \$67 443.86
7 a \$1651.63 b \$246 391.20 c \$112 692.48

CHAPTER 9 Modelling linear and non-linear relationships

Are you ready?

1 a

x	-3	-2	-1	0	1	2	3
y	-6	-4	-2	0	2	4	6

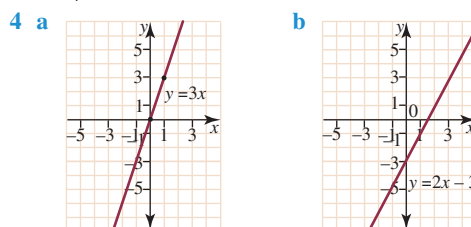
b

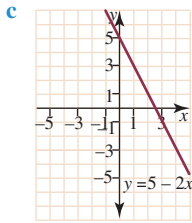
x	-3	-2	-1	0	1	2	3
y	-10	-7	-4	-1	2	5	8

c

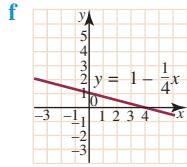
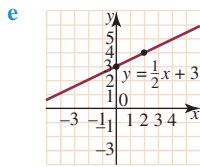
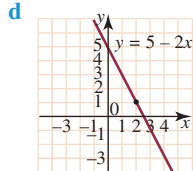
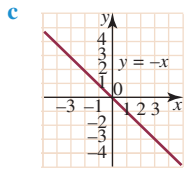
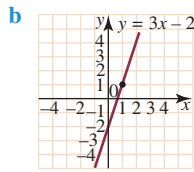
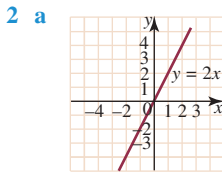
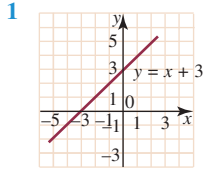
x	-3	-2	-1	0	1	2	3
y	16	13	10	7	4	1	-2

- 2 a Linear b Not linear c Not linear
d Linear e Not linear f Linear
3 a $\frac{5}{4}$ b -3 c -2



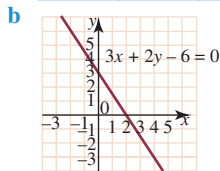


Exercise 9A – Linear functions



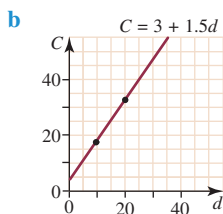
3 a

x	0	2	4
y	3	0	-3



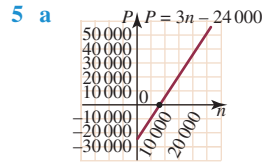
4 a

d	0	5	10	30
C	3	10.5	18	48



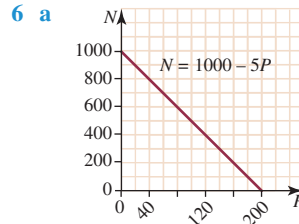
c \$33

d 14 km

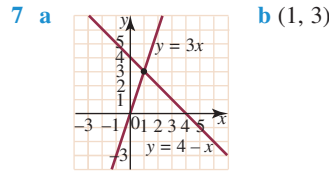


n	0	8 000	10 000
P	24 000	0	6 000

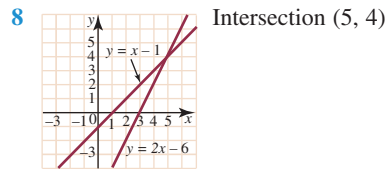
b \$36 000 c \$9000 loss d 8000 people



b 500 c \$1.80

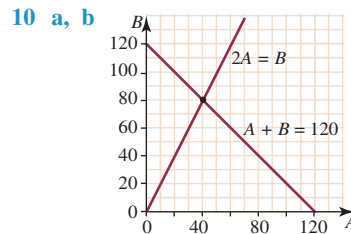


b (1, 3)



Intersection (5, 4)

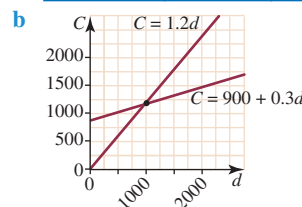
9 (0, 2)



c Game A: 40; Game B: 80.

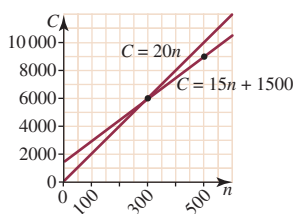
11 a

d	0	1000	2000
C (old)	0	1200	2400
C (new)	900	1200	1500



c After 1000 days

12 a



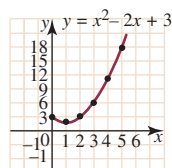
b 300

Exercise 9B – Quadratic functions

1 a

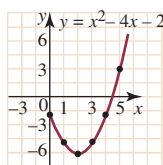
x	0	1	2	3	4	5
y	3	2	3	6	11	18

b

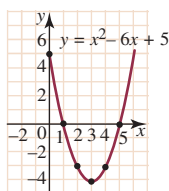


c Min. value = 2

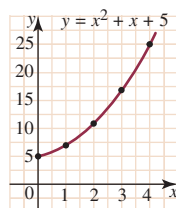
2



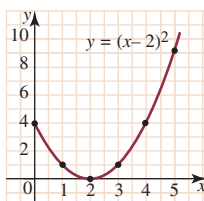
3 a



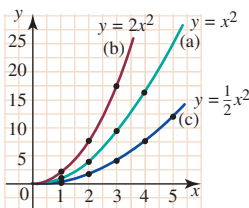
b



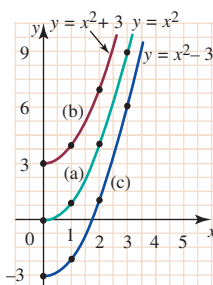
c



4



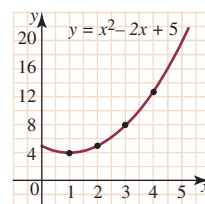
5



6 a The coefficient will make the graph steeper if it is greater than 1 and flatten the graph if it lies between 0 and 1.

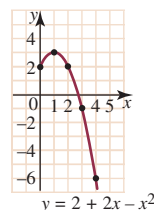
b Adding a constant will lift the graph while subtracting a constant will lower the graph.

7

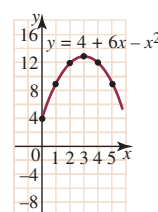


They are the same function.

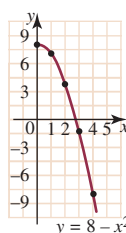
8



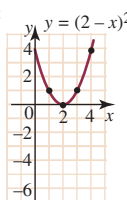
9 a



b



c

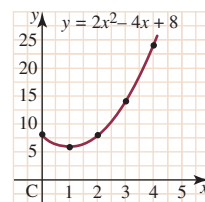


10 D

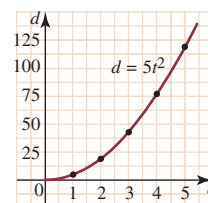
11 C

12 D

13

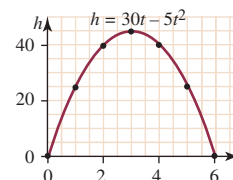


14 a



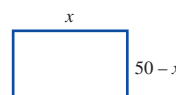
b 80 m c 10 s

15 a



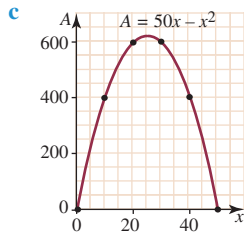
b 45 m c 6 s

16 a



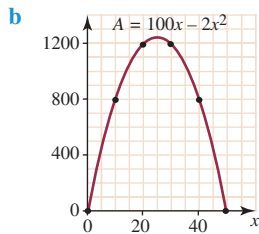
Sum of adjacent sides = 50 m

b $A = l \times b$
 $= x(50 - x)$
 $= 50x - x^2$



d 625 m² when the field is 25 m \times 25 m

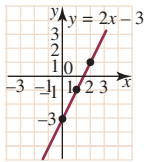
17 a $A = l \times b$
 $= x(100 - 2x)$
 $= 100x - 2x^2$



c 25 m \times 50 m

10 Quick Questions 1

1



2 2

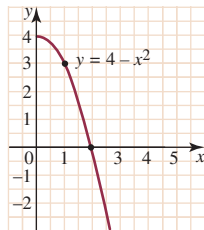
3 -3

4 $y = 3x + 2$

5 Coefficient of x must be negative: e.g. $y = -2x + 7$

6	x	0	1	2	3	4
	y	4	3	0	-5	-12

7



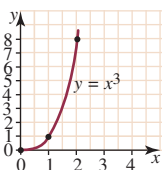
8 4

9 Concave up because the x^2 term is positive.

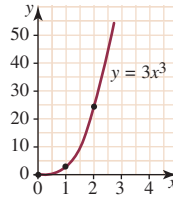
10 5

Exercise 9C – Other functions

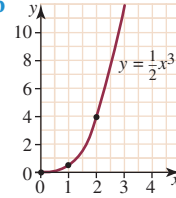
1



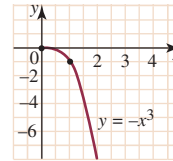
2 a



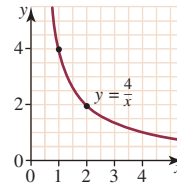
b



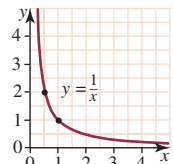
c



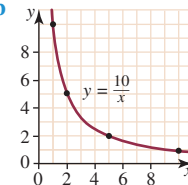
3



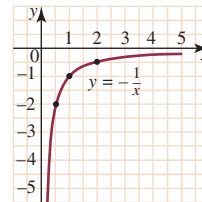
4 a



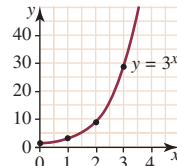
b



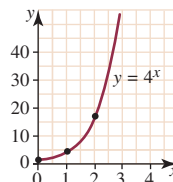
c



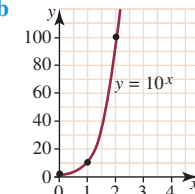
5



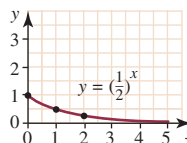
6 a

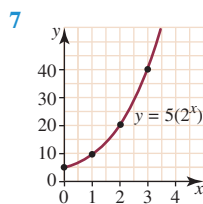


b



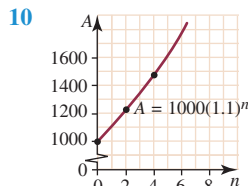
c



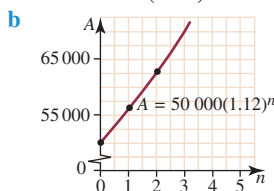


8 C

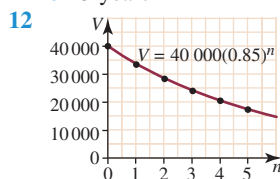
9 B



11 a $A = 50\,000(1.12)^n$



c 3 years

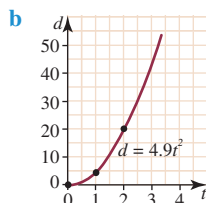


Exercise 9D – Variations

1 $y = 5.5x^2$

2 $b = 0.5a^3$

3 a $d = 4.9t^2$



4 a 6

5 a 3.14

6 a 0.25

7 $y = \frac{50}{x}$

8 $m = \frac{1}{n}$

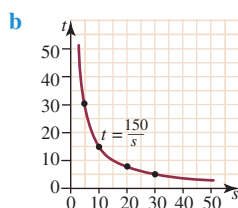
9 a $t = \frac{150}{s}$

b 230.64 cm^2

b 452.16 cm^2

b 54 g

c 6.5 cm



10 a 20

b 2 hours

11 12 km/L or $8\frac{1}{3}$ L/100 km

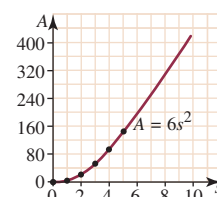
12 8 amps

Exercise 9E – Graphing physical phenomena

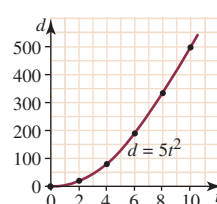
1 a

s	0	1	2	3	4	5
A	0	6	24	54	96	150

b



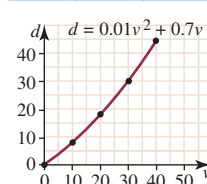
2



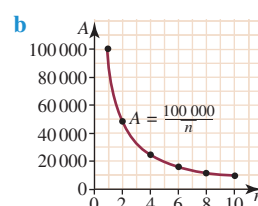
3 a

v	0	10	20	30	40
d	0	8	18	30	44

b



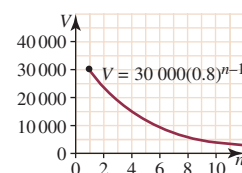
4 a $A = \frac{100\,000}{n}$

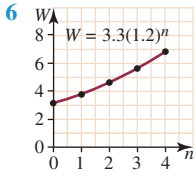


5 a

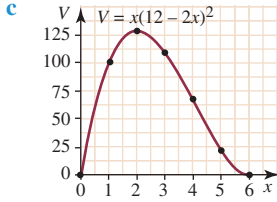
Age (years)	1	2	3	4	5
Value	\$30 000	\$24 000	\$19 200	\$15 360	\$12 288

b



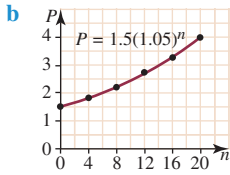


- 7 a 6
b $V = l \times b \times h = (12 - 2x)(12 - 2x)x = x(12 - 2x)^2$

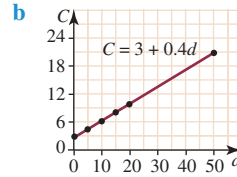


8 a

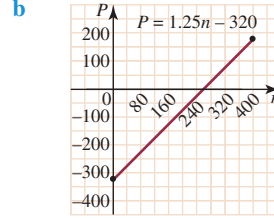
Year	2007	2008	2009	2010	2011
Population (million)	1.5	1.58	1.65	1.74	1.82



- c 2027
d The graph will become a straight, horizontal line.

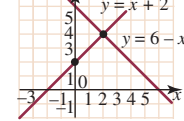


- 3 a $P = 1.25n - 320$

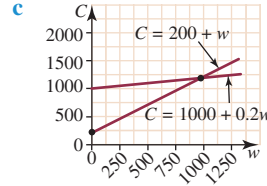


- c i \$55 profit ii \$142.50 loss
d 256

- 4 Intersection (2, 4)

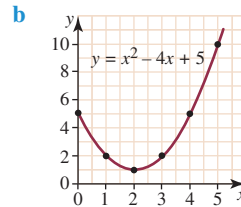


- 5 a $C = 1000 + 0.2w$ b $C = 200 + w$
c d 1000 washes

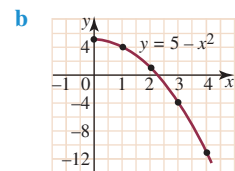
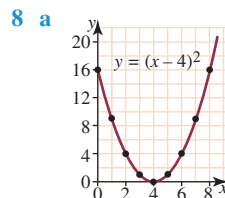
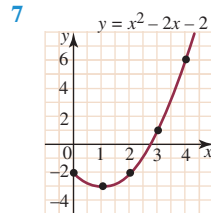


6 a

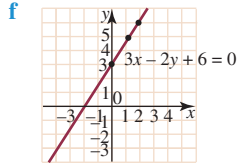
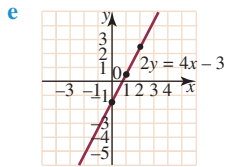
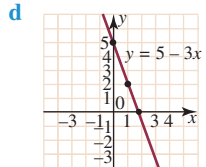
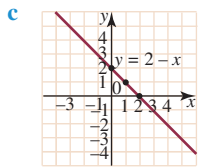
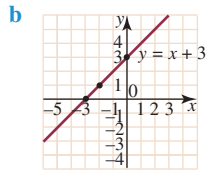
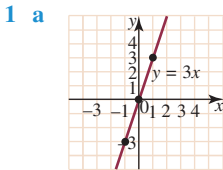
x	0	1	2	3	4	5
y	5	2	1	2	5	10



- c 1

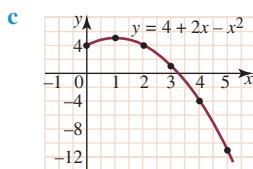


Chapter review

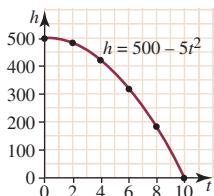


2 a

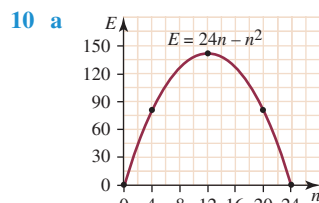
d	0	5	10	15	20
D	3	5	7	9	11



9 a

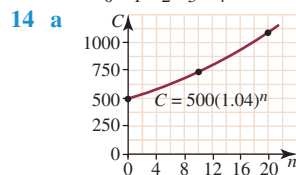
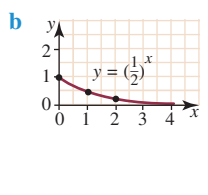
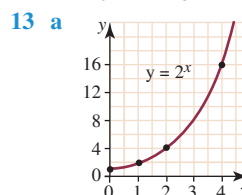
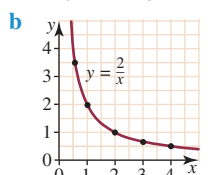
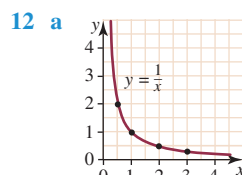
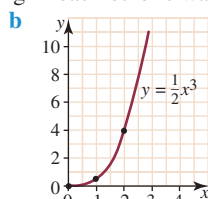
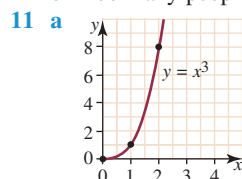


b 10 s

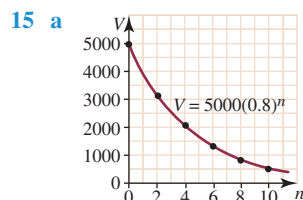


b 144 kg, 12 workers

c Too many people getting in each other's way etc.



b \$740 **c** 2024



b 7 years

16 $y = 5x^2$

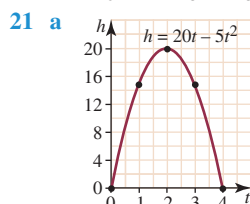
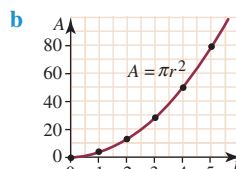
17 a $m = 0.45l^3$ **b** 56.25 g **c** 4.8 cm

18 $y = \frac{64}{x}$

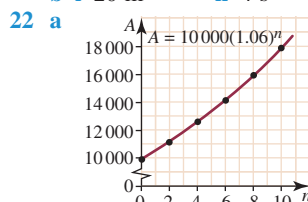
19 a $A = \frac{1000}{n}$ **b** 8 days **c** 250 campers

20 a

r	0	1	2	3	4	5
A	0	3.14	12.57	28.27	50.27	78.54



b i 20 m **ii** 4 s



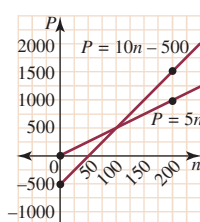
b \$16 000 **c** 7 years

Practice examination questions

1 B **2** D **3** B

5 a $P = 10n - 500$

b, d

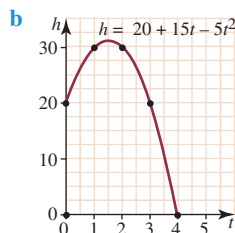


c 50

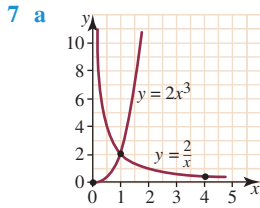
e 100

6 a

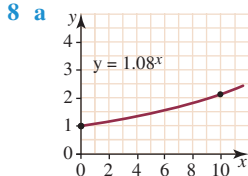
t	0	1	2	3	4
h	20	30	30	20	0



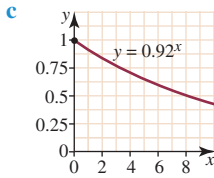
Max. height = 31.25 m when $t = 1.5$



b (1, 2)



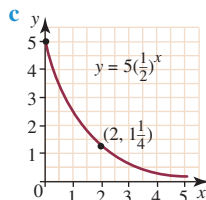
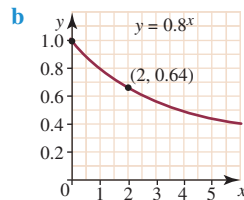
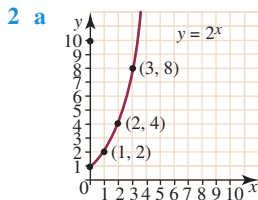
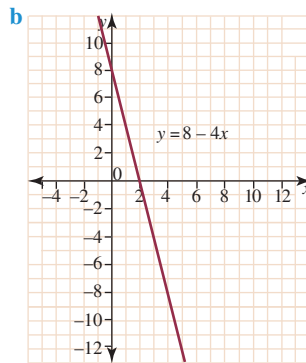
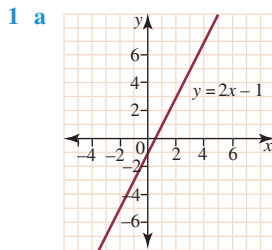
b 10 years



d 8 years

CHAPTER 10 Depreciation

Are you ready?

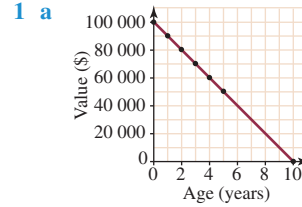


3 a $x = 12$ b $x = 4\frac{1}{3}$ c $x = 5$

4 a \$13 382.26 b \$68 956.60

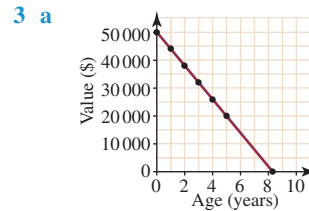
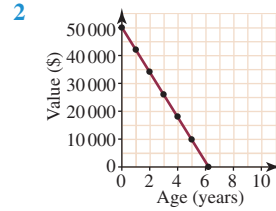
5 a \$13 110 b \$63 100

Exercise 10A – Modelling depreciation



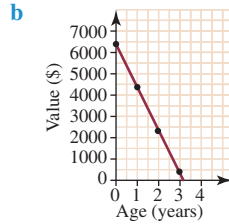
b $V = 100\,000 - 10\,000A$

$V = 50\,000 - 8000A$

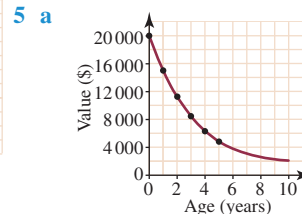


b \$20 000 c 9 years

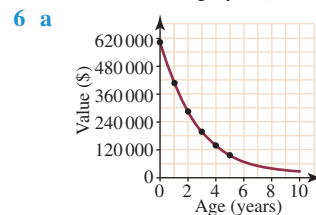
4 a $V = 6400 - 2000A$



c 4

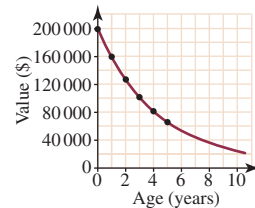


b \$2000



b \$17 000 c 7

7 a i \$160 000 ii \$128 000 iii \$102 400
iv \$81 920 b



8 B

9 a

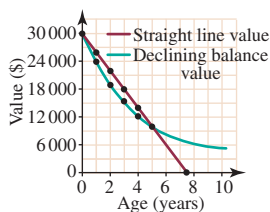
Age (years)	Value (\$)
New (0)	30 000
1	26 000
2	22 000
3	18 000
4	14 000
5	10 000

b See part d

c

Age (years)	Value (\$)
New (0)	30 000
1	24 000
2	19 200
3	15 360
4	12 228
5	9 830

d



e 6 years

Exercise 10B – Straight line depreciation

- \$20 000
- a \$1000 b \$10 300 c \$270 000
d \$145 e \$32 000
- a \$7 125 000 b \$3 750 000
- \$10 600
- 8 years
- a 6 years b 5 years
c 8 years d 7 years
- \$2500/year
- a \$4000/year b \$12 500/year c \$14 500/year
- \$900/year
- \$25 000
- a \$110 000 b \$26 500 c \$1450
- \$78 000

Exercise 10C – Declining balance method of depreciation

- \$20 480
- a \$2220 b i \$750 ii \$390
- 7 years
- \$383 000
- a \$5900 b \$68 100 c \$1200
d \$62 100 e \$3900
- \$6174
- \$676 000
- a \$14 600 b \$20 400

9 A

10 C

11 a \$5360

b \$2640

c \$3591

d \$1769

12 5 years

10 Quick Questions 1

- \$650
- \$2350/year
- 7 years
- \$21 000
- $S = V_0(1 - r)^n$
- \$7250
- \$11 000
- \$389 000
- \$37 500
- 16 years

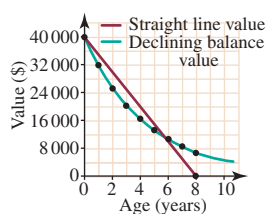
Exercise 10D – Depreciation tables

1 a \$1683.50 b \$9537.50 c \$34 870

2 a

Age of car (years)	Straight line value (\$)	Declining balance value (\$)
New (0)	40 000	40 000
1	35 000	32 000
2	30 000	25 600
3	25 000	20 500
4	20 000	16 400
5	15 000	13 100
6	10 000	10 500
7	5 000	8 400
8	0	6 700

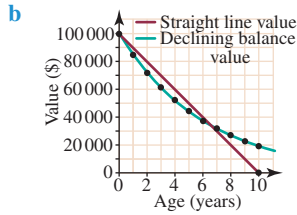
b



c After 6 years

3 a

Age of equipment (years)	Straight line value (\$)	Declining balance value (\$)
New (0)	100 000	100 000
1	90 000	85 000
2	80 000	72 250
3	70 000	61 400
4	60 000	52 200
5	50 000	44 350
6	40 000	37 700
7	30 000	32 050
8	20 000	27 250
9	10 000	23 150
10	0	19 700



4

Age of computer (years)	Salvage value at 20% (\$)	Salvage value at 35% (\$)
0	4400.00	4400.00
1	3520.00	2860.00
2	2816.00	1859.00
3	2252.80	1208.35
4	1802.24	785.43
5	1441.79	510.53
6	1153.43	331.85

5

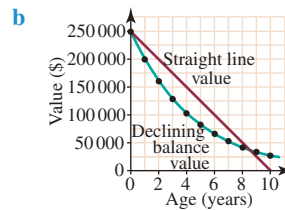
Years	Salvage value (\$)	Tax deduction (\$)
1	4355	2145
2	2918	1437
3	1955	963
4	1310	645
5	878	432
6	0	878

6

Years	Salvage value (\$)	Tax deduction (\$)
1	33 750	11 250
2	25 313	8 437
3	18 985	6 328
4	14 239	4 746
5	10 679	3 560
6	8 009	2 670
7	6 007	2 002
8	4 505	1 502

7 a

Age of truck (years)	Straight line value (\$)	Declining balance value (\$)
New (0)	250 000	250 000
1	225 000	200 000
2	200 000	160 000
3	175 000	128 000
4	150 000	102 400
5	125 000	81 920
6	100 000	65 536
7	75 000	52 429
8	50 000	41 943
9	25 000	33 554
10	0	26 843



c

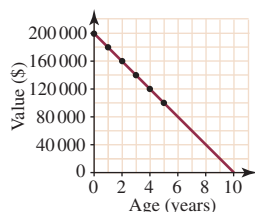
Age of truck (years)	Salvage value — straight line (\$)	Tax deduction (\$)
1	225 000	25 000
2	200 000	25 000
3	175 000	25 000
4	150 000	25 000
5	125 000	25 000
6	100 000	25 000
7	75 000	25 000
8	50 000	25 000
9	25 000	25 000
10	0	25 000

Age of truck (years)	Salvage value — declining balance (\$)	Tax deduction (\$)
1	200 000	50 000
2	160 000	40 000
3	128 000	32 000
4	102 400	25 600
5	81 920	20 480
6	65 536	16 384
7	52 429	13 107
8	41 943	10 486
9	33 554	8 389
10	26 844	6 711

- 8 a \$10 000 b $\frac{1}{3}$ c \$3333.33
 9 a \$3000 b \$75 c \$1600 d \$750

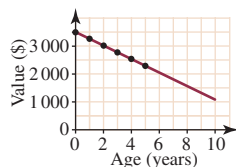
Chapter review

1 a



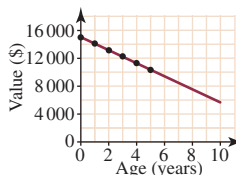
b $V = 200\,000 - 20\,000A$

2 a



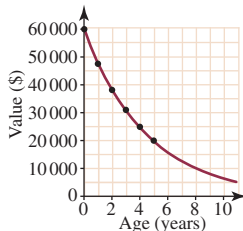
b $V = 3500 - 250A$ c \$1250

3 a



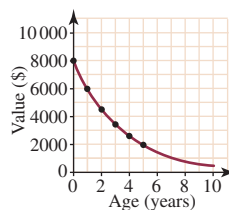
b \$10 500 c 17 years

4 a



b \$6500 c 9 years

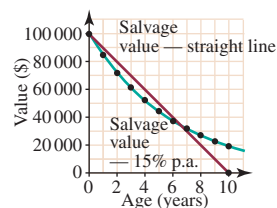
5



- 6 \$6500
 7 a \$1300 b \$15 000 c \$235 000
 8 12 years
 9 \$250/year
 10 After 6 years
 11 \$20 880
 12 \$474 000
 13 a \$23 620 b \$1000 c \$24 290
 d \$27 210 e \$49 380
 14 a \$167 100 b \$432 900
 15 a

Age (years)	Salvage value — straight line (\$)	Salvage value — 15% p.a. (\$)
New (0)	100 000	100 000
1	90 000	85 000
2	80 000	72 300
3	70 000	61 500
4	60 000	52 300
5	50 000	44 500
6	40 000	37 800
7	30 000	32 100
8	20 000	27 300
9	10 000	23 200
10	0	19 700

b

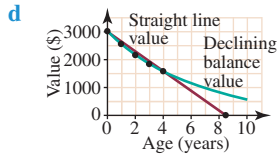


16

Year	Salvage value (\$)	Tax deduction (\$)
1	3015	1485
2	2020	995
3	1353	667
4	907	446
5	0	907

Practice examination questions

- 1 A 2 C 3 A 4 C
 5 a \$1566 b \$1434 c \$358.50/year



- 6 a \$24 000

b

Year	Salvage value (\$)	Tax deduction (\$)
1	176 000	24 000
2	154 880	21 120
3	136 300	18 580
4	119 900	16 400
5	105 500	14 400

- c 11 years

CHAPTER 11 The normal distribution

Are you ready?

- 1 a 5.75 b 65.7 c 8.1 d 17.032
 2 a 2.4 b 17.3 c 1.1 d 1.3
 3 a Sample b Population

Exercise 11A — z-scores

- 1 3
 2 -2
 3 a 0 b 1 c -2 d 3 e -1
 4 a 10.5 b 13.7 c 16.9 d 7.3 e 0.9
 5 -0.27
 6 1.5
 7 a -0.48 b 1.44 c 0.08 d -2.24 e 2.8
 8 a 10.3 s b 10.58 s c 10.37 s
 d 9.88 s e 10.251 s f 10.524 s
 9 a $\bar{x} = 19.55$, $s_n = 1.76$ b 1.68

10 a

Amount (\$)	Class centre	Frequency
0–20	\$10	2
20–40	\$30	8
40–60	\$50	19
60–80	\$70	15
80–100	\$90	6

- b $\bar{x} = 56$, $\sigma_n = 20.1$
 c i -0.30 ii 2.2 iii -2.0
 11 B
 12 B

- 13 C
 14 a $\bar{x} = 64.7$, $\sigma_n = 11.4$
 b Highest score $z = 2.66$, Lowest score $z = -1.73$
 15 English 1, Maths 1.31, Biology 1.5, Computing studies -2, Visual arts 0.67, Music -0.8

Exercise 11B — Comparison of scores

- 1 a English 1.25, Maths 1.33
 b Maths mark is better as it has a higher z-score.
 2 2nd test, Barbara's z-score was -0.33 compared to -0.5 in the first test.
 3 B
 4 D
 5 Course A, z-score of -0.8 compared to -0.75 on course B
 6 a Sydney 0.44, Athens 1
 b In Sydney because of the lower z-score
 7 C
 8 B
 9 a Maths $\bar{x} = 59.5$, $s_n = 17.9$
 Chemistry $\bar{x} = 59.6$, $s_n = 16.8$
 b Maths 0.25, Chemistry 0.20. Maths is the better result.
 10 Kory is the better candidate with a z-score of 1.5 compared with 0.875 for Ricardo.

10 Quick Questions 1

- 1 2
 2 -2
 3 -1.03
 4 2.95
 5 One standard deviation above the mean
 6 Two standard deviations below the mean
 7 50
 8 8
 9 English 1.25, Maths 1.4
 10 Maths

Exercise 11C — Distribution of scores

- 1 a 68% b 95% c 99.7%
 2 a 68% b 95% c 99.7%
 3 95%
 4 16%
 5 a 68% b 16% c 0.15%
 6 21.1 and 33.9
 7 a 68% of the values have a z-score between -1 and 1.
 b 95% of the values have a z-score between -2 and 2.
 c 99.7% of the values have a z-score between -3 and 3.
 8 B
 9 A
 10 0.15%
 11 a 16% b 16%
 12 a 95% b 16% c 34%
 d 15.85% e 83.85%
 13 a 95 g to 105 g b 92.5 g to 107.5 g
 14 163 cm – 181 cm
 15 Faulty, as the one chosen has a z-score greater than 3
 16 2.6 kg – 5 kg

Chapter review

- 1 -2
- 2 a 0 b 1 c -2 d 3 e -1
- 3 1.87
- 4 a 0.17 b 1.83 c -3 d -1.75 e -2
- 5 a $\bar{x} = 20.1$, $\sigma_n = 2.1$
b Highest = 1.91, Lowest = -1.98
- 6 a $\bar{x} = 1130$, $\sigma_n = 334.2$
b i -0.39 ii 2.05 iii -2.62 iv -1.13 v 3.07
- 7 a 1.5 b 1 c Physics, higher z-score
- 8 a Geography: -0.8, Business studies: -0.53
b Business studies: higher z-score
- 9 Numeracy: lower z-score
- 10 a 68% b 95% c 99.7%
- 11 a 68% b 95% c 99.7%
- 12 a 34% b 47.5% c 2.5%
d 0.15% e 97.35%
- 13 Faulty, as it is more than three standard deviations from the mean.

Practice examination questions

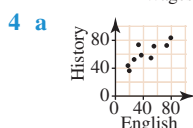
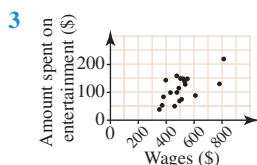
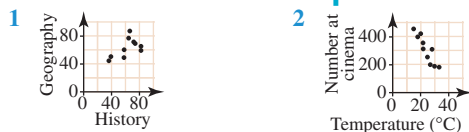
- 1 B 2 B 3 B
- 4 D 5 B 6 C
- 7 a Physics $\bar{x} = 65.1$, $s_n = 5.9$
Chemistry $\bar{x} = 62.4$, $s_n = 11.8$
b Physics -0.02, Chemistry 0.39
c Chemistry has a higher z-score.
d 53.3 and 76.9
e 27 and 97.8
- 8 a -2
b Faulty, more than two standard deviations from the mean

CHAPTER 12 Correlation

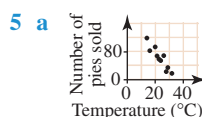
Are you ready?

- 1 a 4 b 15
- 2 a $y = 198$ b $x = 52$
- 3 a 3 b $\frac{1}{4}$
- 4 a 6, positive b $-1\frac{1}{2}$, negative

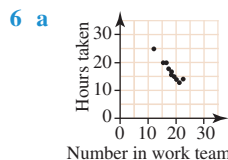
Exercise 12A – Scatterplots



- b The greater the English mark, the greater the History mark generally is. However, as the points on the scatterplot do not form a straight line, the relationship is not linear.



- b The greater the temperature, the fewer pies are sold. The points on the scatterplot approximate a straight line and so the relationship can be said to be linear.



Number in work team

- b The more workers on the team reduces the amount of time taken to unload the ship, and, as the points on the scatterplot form a straight line, the relationship is linear.

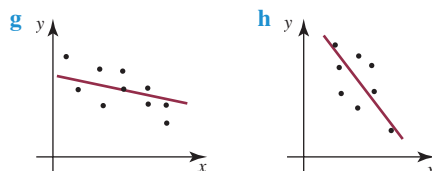
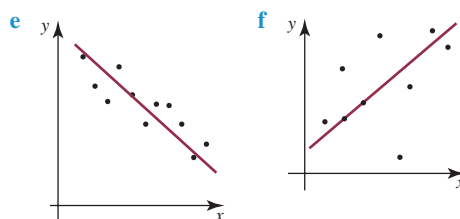
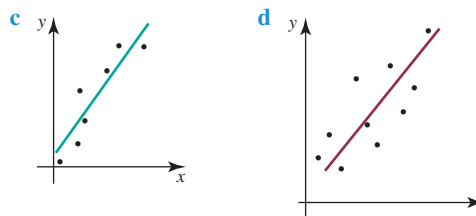
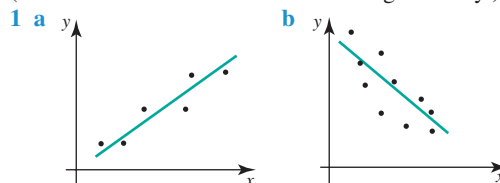
7 D

8 A

- 9 a The scatterplot shows a relationship between 2 quantities. As one increases, the other generally increases.
b The scatterplot shows a relationship between 2 quantities. As one increases, the other generally decreases.

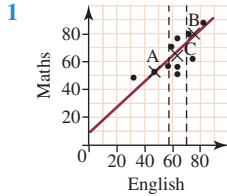
Exercise 12B – Fitting a straight line by eye

(Note: Best fit lines are indicated as a guide only.)

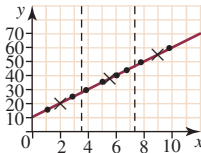




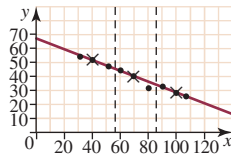
Exercise 12C – Fitting a straight line – the 3-median method



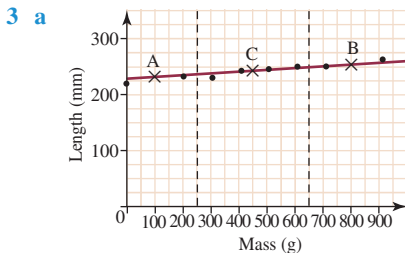
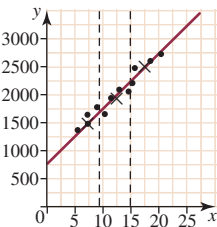
2 a $y = 5x + 12$



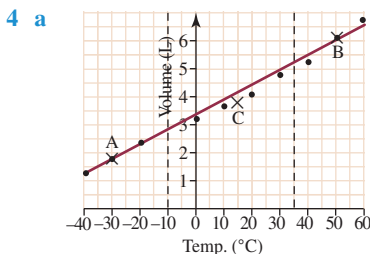
b $y = 70 - 0.4x$



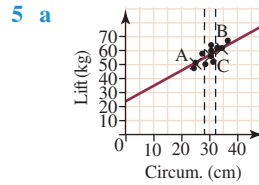
c $y = 80x + 750$



b $L = 0.05M + 220$



b $V = 0.05T + 3.3$



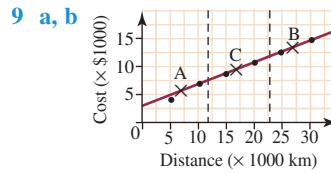
b $S = 1.1C + 24$

6 a \$17.40 b \$8.40 c 20 km d 8.5 km

7 a 159.7 cm b 178 cm

c 31.15 cm d 25.74 cm

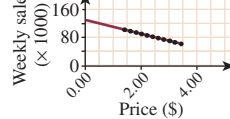
8 a 755 b 295 c 20°C d 38°C



c $C = 0.4d + 2100$

d i \$8100 ii \$2500 iii 14 750 km iv 34 750 km

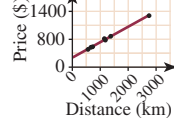
10 a, b c $N = 135 - 20p$



d i 73 000 ii 43 000

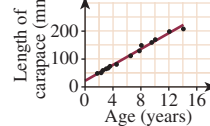
e \$2.75 f \$1.75

11 a b $A = 0.45d + 280$



c i \$582 ii \$1236 iii \$740 iv \$1762

12 a b $L = 14A + 22$



c 92 mm d 246 mm

e 3 years f 106 mm

Note: Some answers may vary slightly depending on the location of the line of best fit.

10 Quick Questions 1

1 \$115 2 \$235 3 \$85 4 3 h 30 min

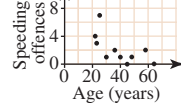
5 6 h 6 2 h 45 min 7 80 8 35

9 2 h 10 4 h 30 min

Exercise 12D – Correlation

1 a Negative b Positive c Positive

2 a b Negative



3 a Weak positive correlation

b Moderate positive correlation

c Strong negative correlation

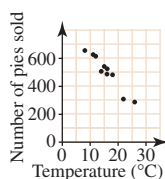
d Weak negative correlation

e No correlation

f Moderate negative correlation

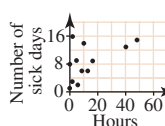
g Strong positive correlation

4 a



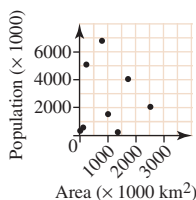
- b There is a strong negative correlation between temperature and the number of pies sold. As temperature increases the number of pies sold decreases.

5 a



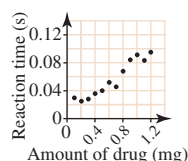
- b There is a moderate positive correlation between the time spent in airconditioned buildings and the number of sick days with colds and flu. As hours spent increases, there is often some increase in the number of days sick.
- c More aspects would need to be examined.

6 a



- b There is no correlation evident.

7 a



- b There is a strong positive correlation indicating that increasing the amount of the drug given increases the reaction time.

8 C

9 B

- 10 a Perfect positive
c Strong positive
e Weak positive
g Strong negative
i Weak negative
- b Weak positive
d Moderate negative
f No correlation
h Moderate negative
j Perfect negative

11 There is a moderate positive correlation.

12 There is a weak negative correlation.

13 a No correlation

- b There is no evidence to connect money and happiness which confirms the statement.

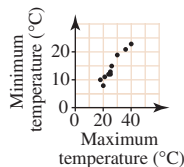
14 a There is a weak negative correlation between obesity and exercise.

- b There is little evidence that connects the amount of exercise and obesity.

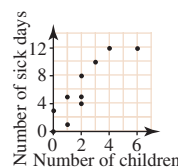
15 B

Chapter review

1

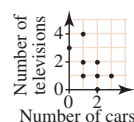


2 a



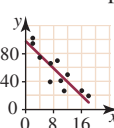
- b There appears to be a positive relationship which is linear.

3 a



- b There is no apparent relationship.

4 a, b



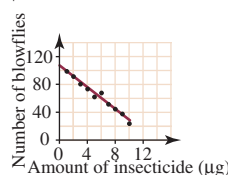
- c $y = 99 - 5x$

5 a

\$242 400

- b \$73 000

6 a



- b $F = 107 - 8I$

c 73

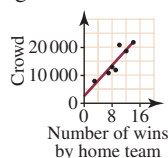
- d 13.4 mg

7 a Negative

b Positive

c Negative

8 a, b



- c Positive

9 a No correlation

- b Perfect positive

c Moderate negative

- d Strong negative

e Weak positive

10 a Strong positive

- b Thicker beams cause greater strengths.

11 a Moderate negative

- b There is some evidence that older people own older cars.

Practice examination questions

1 D

2 D

3 C

4 D

5 A

6 a Yes, the median regression line is straight.

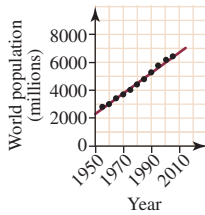
b i 713

ii 2.5 m

c i Positive

ii Moderate

7 a, b



c $P = 80Y + 2200$

d 7 billion

e 2050

CHAPTER 13 Spherical geometry

Are you ready?

- 1 a 69.1 cm b 88.0 m c 40 212.4 km
 2 a 9.42 m b 25.6 cm c 41.5 m
 3 a 2 hours 40 min b 210 minutes
 c 28 days d $1\frac{1}{4}$ years
 4 a 11.112 km b 43.20 M
 c 7778.4 m d 4.07 M

Exercise 13A – Arc lengths

- 1 a 25.1 cm b 56.5 m c 389.6 mm
 d 25.8 km e 87.3 km f 52.2 m
 2 630 km
 3 a 44.0 cm b 123 m c 188 km
 d 368 mm e 11.6 km f 688 km
 4 9400 km
 5 31.83 cm
 6 a 25.5 m b 6.73 cm c 796 km
 7 8.73 cm
 8 a 33.8 mm b 20.4 m c 150.8 cm
 d 27.6 cm e 5.0 km f 20.7 km
 9 a 40 200 km b 4470 km
 10 a 52 km b 136 km
 c Check with your teacher.
 11 a 251 cm b 62.8 cm
 12 a 5.2 cm b 4.3 m c 5696.8 km
 13 112 km

Exercise 13B – Great circles and small circles

- 1 43.98 cm
 2 a 56.5 m b 465 mm c 188 m
 3 40 210 km
 4 314 cm
 5 a 15 320 km b 38 010 km c 21 350 km
 d 449 200 km e 378 690 km f 160 590 km
 g 154 250 km
 6 12.6 m
 7 a 55.3 m b 40.2 m c 6911.5 km
 8 B 9 79 cm 10 20 100 km
 11 a 377 cm b 94.25 cm
 12 a 1750 km b 52.4 m

10 Quick Questions 1

- 1 29.5 m 2 180 cm 3 9.4 cm
 4 A great circle is the circle of greatest possible diameter on the surface of the sphere.
 5 A small circle is any circle drawn on the surface that is smaller than a great circle.
 6 94.25 cm 7 7100 km 8 3140 km
 9 14 450 km 10 33 900 km

Exercise 13C – Latitude and longitude

- 1 a Cairo b Shanghai c Darwin
 d Montreal e London f Auckland
 g Tokyo h Beijing i Rio de Janeiro
 j Oslo
 2 These answers are approximate.
 a (38°S, 145°E) b (40°N, 75°W)
 c (18°N, 76°W) d (26°S, 28°E)
 e (42°N, 12°E) f (35°S, 57°W)
 g (33°N, 44°E) h (55°N, 40°E)
 i (2°N, 104°E) j (18°S, 178°E)

Exercise 13D – Distances on the Earth's surface

- 1 50°
 2 a 40° b 40° c 71° d 21° e 80°
 3 60°
 4 a 1800 M b 3334 km
 5 a 2100 M b 8100 M
 c 2340 M d 5760 M
 6 a 3600 M b 6667 km
 7 a 2700 M b 5000 km
 8 6600 km
 9 a 4356 km b 4021 km c 3798 km
 10 D
 11 B
 12 7 hours 30 minutes
 13 a 110° b 6600 M
 c 12 200 km d 13 hours 45 minutes
 14 10 800 M
 15 a 28° b 1680 M c 3111 km
 d 3128 km
 e 1 M \approx 1.852 km and radius Earth \approx 6400 km.
 We are therefore working with approximations.

10 Quick Questions 2

- 1 151 cm 2 (52°N, 5°E) 3 (28°S, 153°E)
 4 (50°N, 125°W) 5 Rome 6 Colombo
 7 36° 8 2160 M 9 4000 km
 10 4020 km

Exercise 13E – Time zones

- 1 10 h
 2 a 14 h b 7 h c 11 h d 22 h
 3 11:00 pm Monday
 4 a 8:00 pm b 1:00 pm Friday
 c 5:00 pm Wednesday d 11:00 pm Tuesday
 e 3:45 pm Monday
 5 5:00 am Saturday
 6 11:00 pm Tuesday
 7 10:00 am Monday
 8 a 10:00 pm b GMT +11
 c i 3:00 pm Monday ii 8:00 am Friday
 9 a 18 h b 19 h c 17 h
 10 7 h
 11 a 10 h 20 min b 24 min c 2 h 48 min
 12 C
 13 D
 14 2:00 pm Tuesday
 15 a 4:00 pm Wednesday b 8:00 am Sunday
 16 a 1:00 am Wednesday b 3:00 am Wednesday

Chapter review

- 1 a 120.6 cm b 54.0 cm c 289.0 mm
- 2 a 6.3 m b 28.1 cm c 21.9 m
- 3 a 47.1 cm b 7.85 cm
- 4 a 207.3 cm b 44.0 cm c 57.8 m
- 5 56.5 km
- 6 71 cm
- 7 a 41.5 cm b 17.6 m c 9424.8 km
- 8 a Manila b Lima c Santiago
- 9 a (41°N, 3°W) b (1°N, 104°E)
c (43°S, 147°E)
- 10 58°
- 11 a 16° b 960 M c 1778 km
- 12 6 days 6 hours
- 13 a i 3060 M ii 5667 km b 6.375 h

- 14 6000 km
- 15 a 8 h b 11 h c 17 h
- 16 3:00 am Thursday
- 17 3:30 am Tuesday
- 18 a 11:00 am the same day
b 11:00 am the same day
- 19 7:00 pm the same day

Practice examination questions

- 1 A 2 C 3 C 4 C
- 5 a 85° b 9500 km c 9 h
- 6 a Small circle. They lie on the same small circle
because they lie on the same parallel of latitude.
b 12:40 pm Saturday
c 9:20 am Wednesday